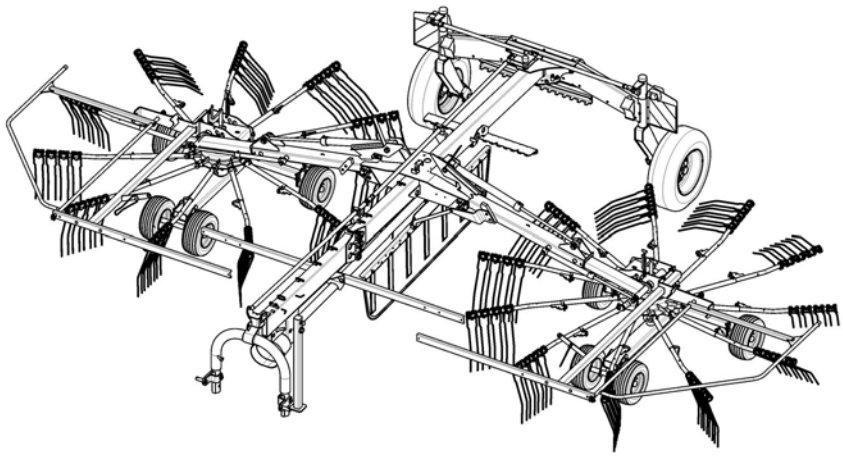


RA2076

Operator's manual

Original operator's manual

Edition	01.2018
Date of print	12.2017
Language	EN
Machine number	UKGRACB6CH2S04501
Model	RAC6958
Document number	A145367940

Machine identification

In order for your dealer to assist you as efficiently as possible, you will need to provide some information about your machine. Please enter the details here.

Designation	RA2076
Working width	7.00 - 7.80 m (23.0 - 25.6 ft)
Weight	1640 kg (2557 lb)
Machine number	UKGRACB6C_ _ _ _ _ _ _ _ _
Accessories	
Address of supplier	
Address of manufacturer	Kverneland Group Kerteminde AS Taarupstrandvej 25 DK-5300 Kerteminde Denmark Tel: +45 65 19 19 00

Table of contents

Target group for this operator's manual

Simplified illustrations for better understanding
Illustrations of the machine in the operator's manual are shown without protective equipment – or with the protective equipment open – for better understanding. Be sure to observe the safety information and follow the handling instructions in the operator's manual. Serious or fatal injury may be caused as a result.

This operator's manual is aimed at trained agriculturists and persons who are otherwise qualified for agricultural activities and have received instruction in working with this machine.

For your safety
You must familiarise yourself with the contents of this operator's manual before assembly or initial operation of the machine. In this way, you will achieve optimum work results and operational safety. The operator's manual forms an integral part of the machine and must always be kept to hand. This will ensure that you:

- avoid accidents.
- comply with warranty conditions.
- have a fully functional machine in good working order at all times.

Training and instruction

Your dealer will provide instruction on operation and care of the machine.

Information for the employer
All personnel are to be regularly, but at least once a year, instructed on the use of the machine, in accordance with the regulations of the national organisation for Health and Safety at Work. Untrained or unauthorised persons are not permitted to use the machine.

You are responsible for ensuring that the machine is operated and maintained safely. Make sure that you and all other persons that operate, maintain or work in close proximity with the machine are familiar with the operating and maintenance regulations, as well as the corresponding safety instructions in this operator's manual.

Symbols used

In this operator's manual, the following symbols and terms have been used:

- A bullet point accompanies each item in a list.

▸ A triangle indicates operating functions which must be performed.

→ An arrow indicates a cross-reference to other sections of this manual.

[+] A plus sign indicates additional equipment which is not included in the standard version.

The warning triangle indicates warning information. Failure to observe these safety instructions can result in:

- Moderate to serious injury
- Fatal injury

The warning information in the operator's manual is specifically associated with individual operations and instructions. It is important to observe the warning information before these operations are carried out.

In the »Safety« chapter, you will also find safety information which is not related to individual operations, but rather is designed to encourage safety-conscious behaviour in various situations.

The information triangle indicates important information. Failure to observe these safety instructions can result in:

- Serious faults in the correct operation of the machine
- Damage to the machine

We have also used pictograms to help you find instructions more quickly:

The "Information" pictogram indicates tips and additional information.

The “Examples” pictogram indicates examples that assist understanding of the instructions.

The spanner indicates tips for assembly or adjustment work.

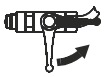
This arrow in the diagram shows the direction of travel.

The brush indicates the points that must be lubricated using the brush.

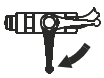
The grease gun indicates the points that must be lubricated using the grease gun.

- Switch on the tractor engine.

- Switch off the tractor engine, put the parking brake in the park position, remove the ignition key and secure the tractor against rolling away.



Open the ball valve.



Close the ball valve.

Switch the pilotbox on.

Switch off the pilotbox.

For your safety

Familiarise yourself with your equipment and its limitations. Read the entire manual before attempting to put the machine into operation and to use it.

This chapter contains general safety instructions. Each chapter of the operator's manual contains additional specific safety information which is not described here. Observe the safety information:

- in the interest of your own safety.
- in the interest of the safety of others.
- to ensure the safety of the machine.

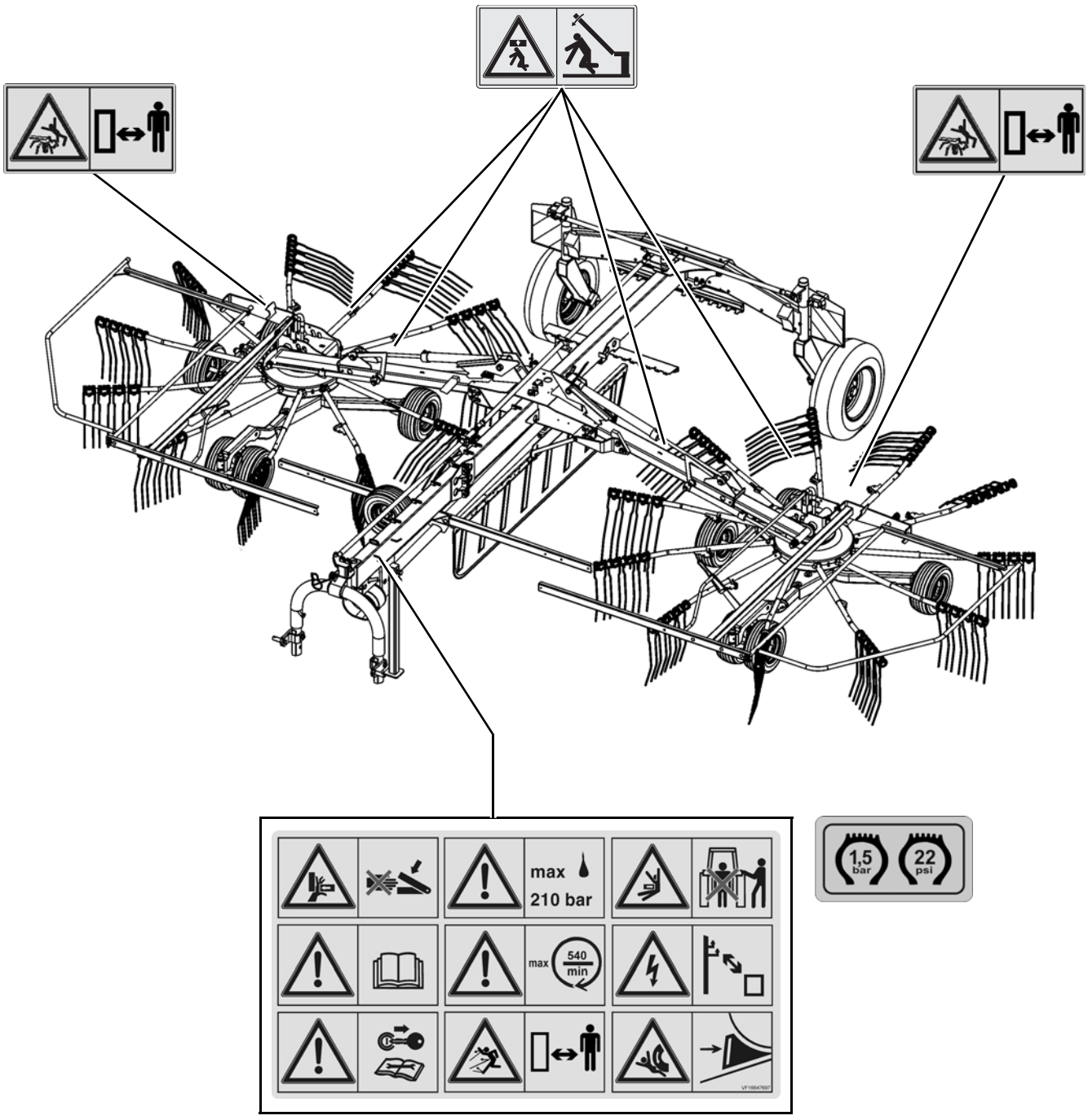
Numerous risks can result from handling agricultural machinery in the wrong way. Therefore, always work with particular care and never under time pressure.

Information for the employer
Persons who work with the machine must be regularly informed of the safety information in this operator's manual. Staff must also be regularly trained in accordance with statutory regulations regarding occupational health and safety. Untrained or unauthorised persons are not permitted to use, maintain, repair or service the machine.

Warning signs

Safety-related labels attached to the machine indicate potential hazards. The labels must not be removed. Illegible or missing labels should be replaced. You can obtain new labels as replacement parts from your dealer.

Warning signs on the machine



Meaning of warning signs

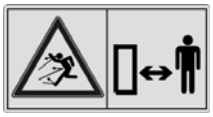
Read the operator's manual
Read and follow the operating and safety instructions before using the machine for the first time. The machine must not be used for the first time until the operator's manual has been read and understood. This applies in particular to the safety information. Otherwise, serious or fatal injury may be caused as a result.

Switch off the engine
Only perform maintenance, repair and adjustment work when the machine is shut down. Otherwise, serious or fatal injury may be caused as a result.

Distance from the rotor
Maintain a safe distance from the rotor when it is rotating. Nobody may remain in close proximity to the machine when tedders and rakes are running. Otherwise, serious or fatal injury may be caused as a result.

Distance from tractor
When the machine is being coupled, uncoupled or operated, there should be no-one between the tractor and the machine. Otherwise, serious or fatal injury may be caused as a result.

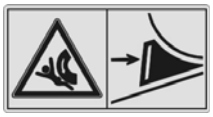
Risk of crushing
Never reach into an area where there is a risk of crushing if parts in that area are still likely to move. Otherwise, serious or fatal injury may be caused as a result.



Caution, parts ejected at speed
Hazard caused by parts which may become detached when the drive is in operation, and ejected at speed. Maintain a safe distance. Otherwise, serious or fatal injury may be caused as a result.

No persons within the slewing range
There is an acute risk of injury within the slewing range from machine parts which are slewing or folding. Otherwise, serious or fatal injury may be caused as a result.

Caution, high voltage
Maintain a sufficiently safe distance from high-voltage lines. Otherwise, serious or fatal injury may be caused as a result.



Secure the machine with wheel chocks
Always secure the machine with wheel chocks to ensure it cannot roll away when it is in park or stop position. Otherwise, serious or fatal injury may be caused as a result.

PTO shaft speed 540 rpm
The specified maximum PTO shaft speed of 540 rpm must not be exceeded. Otherwise, damage to the machine may be caused as a result.

Do not exceed the maximum hydraulic pressure
The tractor's hydraulic pressure on the machine's hydraulic system must not exceed 210 bar. Otherwise, damage to the machine may be caused as a result.

Check tyre pressures
Check tyre pressures on a regular basis. Incorrect tyre pressures reduce the service life of a tyre and cause unstable driving characteristics. Accidents with serious or fatal injuries may be caused as a result.

Jacking points for carriage jack
Jacking points for the carriage jack are identified with the sticker. Secure the machine and use a suitable carriage jack. Proceed in accordance with the instructions in the "Maintenance" chapter.

Lubrication points
Lubrication points are marked with an information label. Lubricate the machine in accordance with the instructions in the "Maintenance" chapter.

Who is allowed to operate the machine?

Only qualified persons may operate the machine
Only qualified persons who have been informed of the dangers associated with handling the machine are permitted to operate, service or repair the machine. The necessary knowledge can be gained in the course of agricultural vocational training, professional training or intensive instruction.

General safety information

The general safety information and warning signs apply to every phase of the life cycle of the machine and to every application.

Switch off the tractor and secure it
Before you dismount:

- Switch off the PTO shaft drive.
- Lower all implements.
- Switch all operating controls to the neutral or park position.
- Put the tractor's parking brake into the park position.
- Switch off the tractor.
- Remove the ignition key.
- Secure the tractor against rolling away.

An unsecured tractor can run you over or trap you. Otherwise, serious or fatal injury may be caused as a result.

Operate for the first time only after proper training
The machine may only be put into operation if thorough training has been carried out by an authorised dealer or by an employee of the manufacturer. Operation without proper training can lead to damage to the machine due to incorrect operation, or may cause accidents.

Safety is your responsibility
Follow the safety instructions. Ensure that all operators comply with the safety instructions. Prevent serious or fatal accidents by following the safety instructions.

Instructions in the event of malfunctions
In the event of a malfunction

- shut down,
- stop and secure the machine immediately.
- Immediately rectify the faults, if you are qualified to do so,
- or commission an authorised dealer.

Operating a faulty machine can cause accidents or damage.

No persons in the working area
Ensure that no persons – children in particular – are present in the slewing and working area of the machine. Persons could be caught by the machine within this area. This could result in fatal injury.

Correct working conditions
Ensure that the tractor and the machine are always in perfect working condition. Make sure that the tractor brakes work in conjunction with the machine. Also follow the instructions in your tractor's operator's manual.

Switch off the PTO shaft drive when lifting the machine
Switch off the tractor's PTO shaft drive if people could enter the working area of the machine when you

- raise the machine,
- raise the rotors to the headland position.

Rotating, unprotected parts can damage the machine and cause life-threatening injuries.

Switch off the tractor PTO shaft drive
Switch off the PTO shaft drive on the tractor when changing from work to transport position (and vice versa). Wait for moving parts to come to a stop. If this requirement is ignored, the consequence may be damage to the machine and even life-threatening injuries.

No reversing while the drive is running
Never drive in reverse with the PTO shaft drive switched on and in the work position if people could enter the working area of the machine. Switch off the PTO shaft drive. Rotating, unprotected parts can damage the machine and cause life-threatening injuries.

Specified workwear
Do not wear baggy, loose-fitting or other unsuitable clothing. Loose fitting items of clothing may become caught in rotating parts. Wear workwear and protective clothing which is suitable for the working environment and the operating conditions. Wear workwear and protective clothing, as specified by the Accident Prevention and Insurance Association. Serious or fatal injury may be caused as a result.

No riding on the machine
Persons or objects must never be transported on the machine. Carrying passengers – particularly children – on the machine is life-threatening and prohibited. Serious or fatal injury may be caused as a result.

Safety for children
Never assume that children will remain where you last saw them. Be alert and shut down the machine if children are in the working area of the machine. Prohibit children from playing on or around the machine and from operating the machine.

Never work on the machine while it is running
No operations may be performed on the machine while it is running. Objects or persons can be caught, drawn in or crushed. Serious or fatal injury may be caused as a result.

Safe distance from raised and unsecured loads
Never work under suspended loads. Maintain a sufficient distance from raised and unsecured loads. Serious or fatal injury may be caused as a result.

Only use the PTO shaft specified
Use only the PTO shafts specified by the manufacturer and read the attached operator's manual carefully. Adjust the length of the PTO shaft as required. Incorrect PTO shaft lengths can cause damage to the machine and personal injury.

Check and fasten the PTO shaft guard in position
The rotating PTO shaft is protected by the PTO shaft guard. Ensure that the guard is not damaged. Fasten the PTO shaft guard in position by connecting the chains on the implement and the tractor. Unguarded PTO shafts can cause life-threatening injuries.

Make sure the machine is standing level
Before changing from the transport to the work position (and vice versa), make sure the machine is standing level. The machine could tip over, particularly on hillside locations. Otherwise, damage to the machine and serious or fatal injury may be caused as a result.

Do not make any modifications to the machine
No modifications of any kind may be made to the machine. Unauthorised modifications can adversely affect the correct operation and safety of the machine and shorten its service life. Unauthorised modifications to the machine render the manufacturer's guarantee null and void and free the manufacturer from all liability.

Maximal PTO shaft speed: 540 rpm
The specified maximum PTO shaft speed of 540 rpm must not be exceeded. A higher PTO shaft speed will damage the machine.

Do not use PTO shafts with disconnect couplings
Only use PTO shafts which have been specified by the manufacturer. PTO shafts with disconnect couplings may allow higher disconnect torques. Higher disconnect torques may damage the machine.

Unrestricted field of vision to the rear
After it has been coupled, ensure that you have an unrestricted view of the machine, in both its work and transport positions. Otherwise, dangerous situations may not be detected in good time. resulting in accidents or damage.

Check the angle of lock
On machines with a 2-point attachment carrier, a steering angle of 90° is possible. This angle must not be exceeded. Otherwise, damage to the PTO shaft may be caused as a result.

Coupling

Increased risk of injury
When the machine is being coupled to the tractor, there is an increased risk of injury. Therefore:

- Secure the tractor against rolling away, shut off the engine and remove the ignition key.
- Never stand between the tractor and machine.
- Lock the PTO shaft securely on the PTO stub shafts of the tractor and the machine.

If this requirement is ignored, the consequence may be damage to the machine and even life-threatening injuries.

Attaching electrical connections after assembly
The electrical supply to the tractor must not be connected when the lighting equipment is being fitted. Otherwise, short circuits may occur and the electronic system may be damaged.

Observe the operator's manual of the PTO shaft manufacturer
Observe the operator's manual of the PTO shaft manufacturer. It will provide you with instructions on how to handle the PTO shaft correctly. If these instructions are ignored, damage may be caused to the PTO shaft and machine.

Risk of tipping due to unsecured quick-release couplings
When the machine is coupled to tractors with lower link quick-release couplings, the quick-release couplings must be secured against unintentional opening. If the quick-release couplings open unintentionally, the tractor and machine may tip over. If this requirement is ignored, the consequence may be damage to the machine and even life-threatening injuries. Also follow the instructions in your tractor's operator's manual.

Hydraulics

Only connect hydraulics at zero pressure
Only connect hydraulic hoses to the tractor hydraulic system if the tractor and machine hydraulic system is at zero pressure. A pressurised hydraulic system can trigger unpredictable movements of the machine and can cause serious machine damage and personal injury. Serious or fatal injury may be caused as a result.

High pressures in the hydraulic system
The hydraulic system is under high pressure. Regularly check all lines, hoses, and screwed connections for leaks and externally visible damage. Only use suitable tools when looking for leaks. Rectify any damage immediately. Oil escaping under pressure may result in injuries and fires. Seek medical attention immediately if injuries occur.

Uniquely coded hydraulic connections
The hydraulic connections are uniquely coded. Only matching hydraulic couplings between the tractor and machine must be connected. Wrongly connected hydraulic couplings can trigger unpredictable movements of the machine.

Replace hydraulic hoses every six years or sooner
Hydraulic hoses age without showing externally visible signs. Replace hydraulic hoses every six years or sooner. Use hydraulic hoses only with the same technical specifications. The required information is printed on the hydraulic hose. Defective or incorrect hydraulic lines can cause serious or fatal injuries.

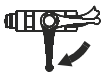
Road transport

Ensuring road safety

The machine must conform to current national traffic regulations if you intend to drive with it on public roads. Ensure the following:

- Lighting, warning and protective equipment must be fitted.
- The permissible transport widths and weights, axle loads, tyre load-bearing capacities, laden weights and national speed restrictions must be complied with.
- The maximum permissible road transport speed must be complied with, but not exceed 40 km/h (25 mph).
- Before driving on public roads, fold in all guard bars and rotors and secure the machine.
- All tine supports which have tips that point at right angles to the direction of travel and which are at a height of less than 2 metres must be safeguarded using the tine covers provided, or otherwise detached.
- The machine should only be towed by agricultural or forestry tractors.

The empty weight of the tractor must be greater than the weight of the machine. The driver and keeper of the vehicle are liable should these conditions not be observed.



Close the ball valve

Close the ball valve before driving on the road. If the ball valve is open and there is an operating error, the machine may drop or swing out unexpectedly. This can result in traffic accidents and accidents causing serious or fatal injuries.

Check the tyre pressures

Check tyre pressures on a regular basis. Incorrect tyre pressures reduce the service life of a tyre and cause unstable driving characteristics. Accidents with serious or fatal injuries may be caused as a result.

Altered driving and braking performance
Driving and braking characteristics are altered when the machine is coupled or hitched to the tractor. When cornering, take the overall width and balancing weight of the machine into consideration. Adjust your driving speed accordingly. A driving style which is not adapted to conditions can cause accidents. Accidents with serious or fatal injuries may be caused as a result.

Speed adjustment
In poor road conditions and at high speeds, significant forces can be generated which subject the tractor and machine material to high or excessive stresses. Adjust your driving speed to the road conditions. A driving style which is not adapted to conditions can cause accidents. Accidents with serious or fatal injuries may be caused as a result.

Check hitch pins
Hitch pins must be in perfect condition. Hitch pins must show no signs of wear and be properly secured. Otherwise, hitched machines may detach themselves of their own accord. Accidents with serious or fatal injuries may be caused as a result.

Check release ropes on quick-release couplings
Release ropes must hang loose and must not allow a release in their lowered position. Hitched machines may otherwise detach themselves from the lower link hitching system of their own accord. Accidents with serious or fatal injuries may be caused as a result.

Operation

Operate for the first time only after proper training
The machine may only be put into operation after proper training has been provided by an employee from a dealership or the manufacturer, or by a factory representative. Operation without training can lead to damage to the machine due to incorrect operation, or cause accidents.

Ensure that the machine is in perfect working condition
Do not operate the machine unless it is in perfect working condition. Check all key components and their correct operation before use. Replace defective components. Defective components can cause material damage and personal injury.

Check the protective equipment
The protective equipment must not be removed or by-passed. Check all protective equipment before using the machine. Unprotected machine parts can cause serious or fatal injury.

Check the immediate vicinity
Check the area immediately surrounding the machine before driving off, and continually during operation. Make sure that you have an adequate view. Only begin work when the immediate vicinity is cleared of any persons or objects. Serious or fatal injury may be caused as a result.

Retighten all nuts, bolts and screws
Regularly check that nuts and bolts are correctly tightened. Retighten bolts if necessary. Nuts and bolts can work loose when the machine is used. Damage to the machine or accidents may be caused as a result.

→ Observe the correct torque specifications in chapter »Screw and bolt tightening torques« on page 84.

The PTO shaft drive continues turning after it has been switched off
After the PTO shaft drive on the tractor has been switched off, the machine continues to run due to the moment of inertia. Maintain a sufficiently safe distance until all moving parts have come to a complete standstill. Otherwise, damage to the machine and serious or fatal injury may be caused as a result.

Cornering and turning manoeuvres
Centrifugal forces are in operation during cornering. The machine's centre of gravity at the rear of the tractor is displaced. Be aware of the turning radius and the moment of inertia. A driving style which is not adapted to conditions can cause accidents. Accidents with serious or fatal injuries may be caused as a result.

Uncoupling

Increased risk of injury
There is an increased risk of injury when uncoupling the machine from the tractor.
Therefore:

- Switch off the tractor engine, put the parking brake in the park position, remove the ignition key and secure the tractor against rolling away.
- Never stand between the tractor and machine.
- Set the machine down on firm, secure and level ground.
- Ensure that the parking stand is securely locked.
- Place the PTO shaft in the holder provided.
- Secure the machine against rolling away.

Failure to observe these instructions can result in serious or fatal injury.

Care and maintenance

Observe the care and maintenance intervals
Observe the periods specified in the operator's manual for recurrent checks and inspections. If these periods are not observed, damage to the machine and accidents may be caused as a result.

Use original parts
Many components have special properties that are essential for the stability and correct operation of the machine. Only spare parts and accessories supplied by the manufacturer have been tested and approved. Other products may adversely affect the correct operation of the machine and safety. Using non-OEM replacement parts renders the manufacturer's guarantee null and void and frees the manufacturer from all liability.

When performing care and maintenance work:

- Switch off the PTO shaft drive.
- Depressurise the hydraulic system.
- Whenever possible, uncouple the tractor.
- Switch off the tractor engine, put the parking brake in the park position, remove the ignition key and secure the tractor against rolling away.
- Ensure the machine is standing on firm, secure and level ground, and provide additional support, if necessary.
- Secure the machine against rolling away.

Only if these regulations are observed can safe working be ensured during care and maintenance work.

Turn off the electrical supply
Disconnect the power supply before working on the electrical system. Systems being supplied with electrical power can cause damage to equipment and injury to persons.

Caution when cleaning with a high-pressure cleaner
Exercise caution when cleaning with a high-pressure cleaner. Bearings, seals and pipe unions are not waterproof. In order to prevent damage to the machine, the bearings, seals and pipe unions must not be exposed to direct contact with the high pressure water jets.

No aggressive washing additives
Do not use any aggressive washing additives for cleaning. Uncoated metal surfaces can be damaged.

Before carrying out welding work
Disconnect all electrical connections from the tractor when carrying out welding on the hitched machine. Damage may otherwise be caused to the electrical system.

Retighten all nuts, bolts and screws
All screwed/bolted connections that are loosened during maintenance and repair operations must be retightened. Serious injury and damage to equipment can be caused by loose pin and screwed connections.

→ Observe the correct torque specifications in chapter »Screw and bolt tightening torques« on page 84.

Further regulations

Observe the regulations
In addition to the safety information listed above, observe the following:

- Regional accident prevention regulations.
- Generally recognised safety regulations, occupational health requirements and road traffic regulations.
- The instructions provided in this operator's manual.
- Standards and instructions relating to operation, maintenance and repair.

Warranty

The warranty and manufacturer's liability will no longer be valid if the instructions provided in the chapter on Safety are not observed, if maintenance is inadequate or faulty, if the machine is used for purposes other than those for which it was intended and if it is over-stressed, or if impermissible modifications are made to the machine.

Range of application

This product is classified as replaceable equipment in accordance with EC directive 2006/42/EC and agricultural implement in accordance with ASABE S390.

The machine is a two-wheel rake that is solely to be used for raking together mown, stalked material (for example, hay or straw).

Proper use

Any other use, for example, for silo distribution, any form of soil preparation, road sweeping or for the transmission of power to other machines, is not permitted. The manufacturer and dealers are not liable for damage caused by improper use. The risk is borne solely by the user.

Features

Flexible in operation
This central rake, which has a working width of approximately 7,80 metres, meets all the requirements of modern crop harvesting engineering. All the important functions for field use are controlled during operation. The following functions should be set without leaving the tractor:

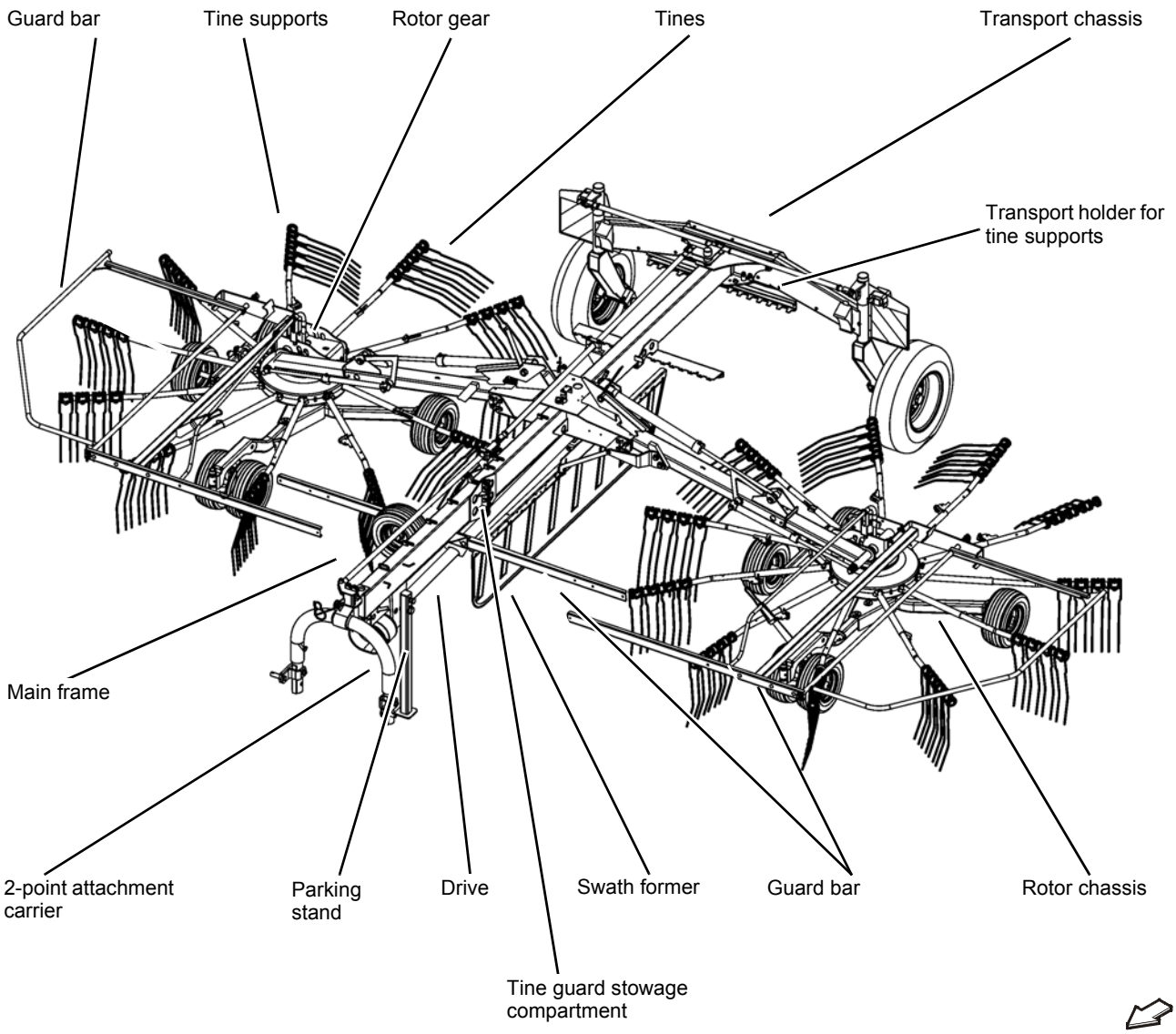
- Deposit of crop in single rotor operation via the hydraulic single lift.
- Individual working depth of both rotors.
- Swath width.

The rake can be pulled by tractors of 35 kW (47 hp) or more.

Extensive equipment
The machine is equipped with low-maintenance gearboxes and 11 tine supports on each rotor. The cranked tines achieve an excellent raking quality.
The “TerraLink” support ensures outstanding adjustment to the contours of the land.
The automatic system swivels the swath former into the selected transport or work position.

Easy changeover from work to transport position
The rake is easily changed over from the work to the transport position. Hydraulic cylinders lift the rotors into the transport position to maintain the transport width of less than 2.80 m.

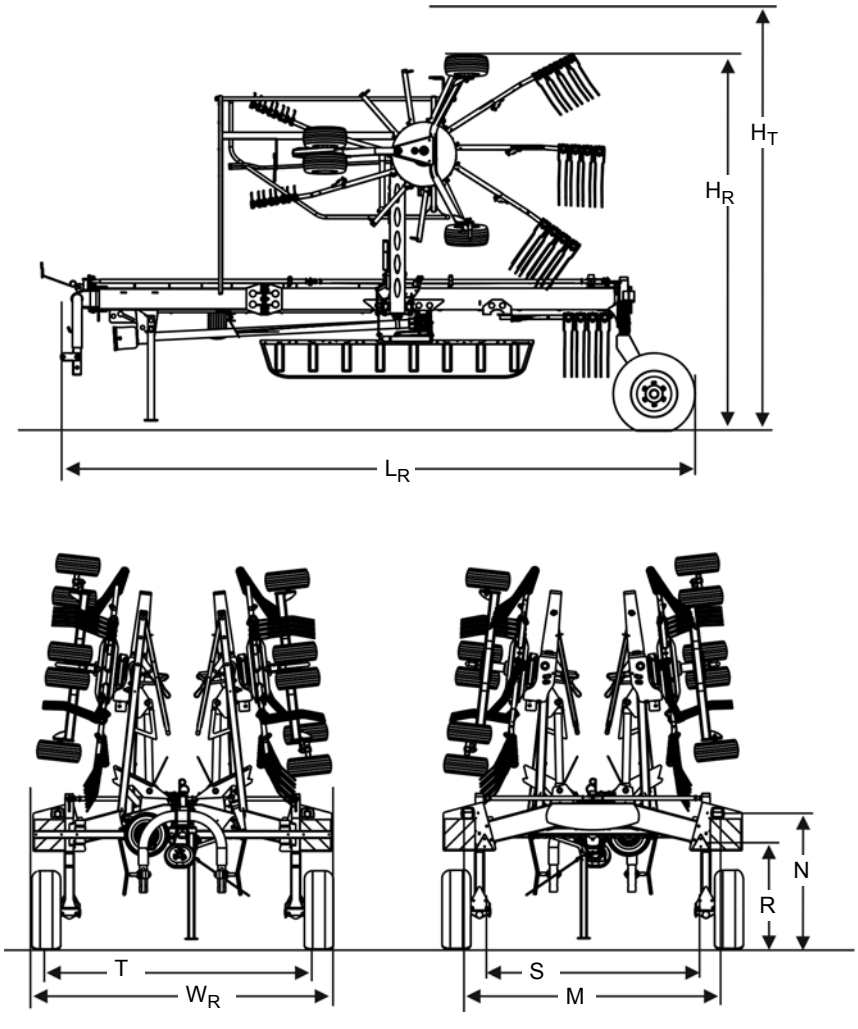
Designation of components



Technical specifications

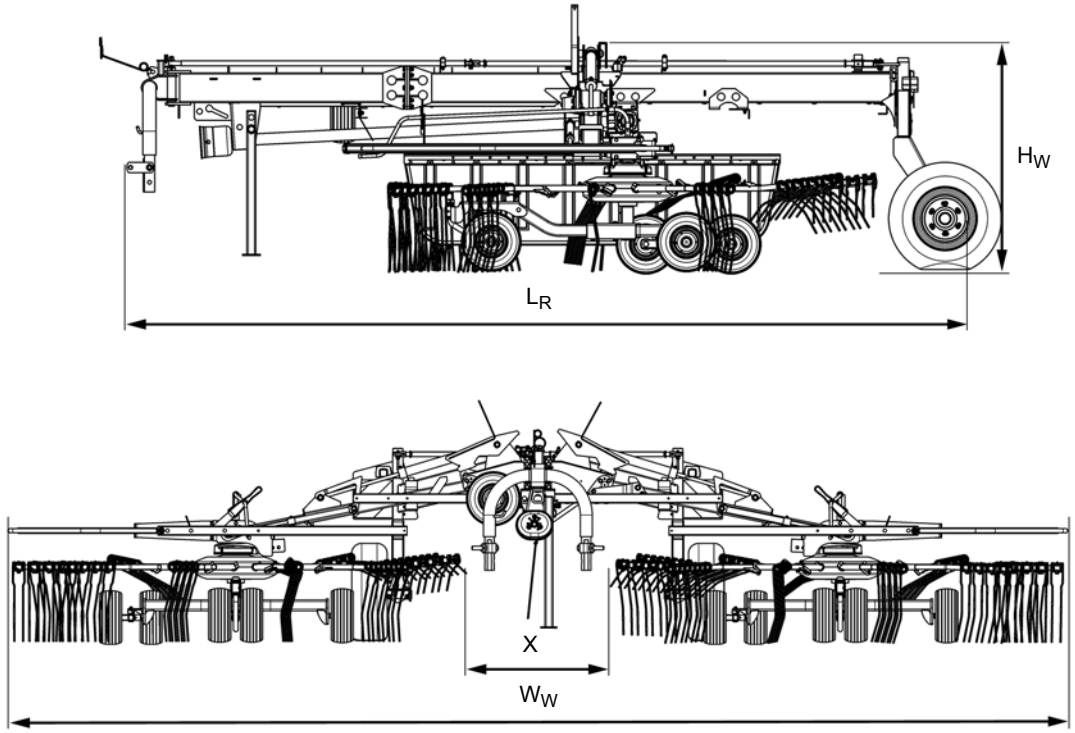
Dimensions

Transport position		[m]
L_R	Length in transport position	5.90 m (16.36 ft)
H_T	Height with all tine supports (prohibited for road transport)	4.25 m (13.95 ft)
H_R	Height without the upper tine supports for road transport	3.90 m (12.80 ft)
W_R	Width in transport position	2.90 m (9.55 ft)
T	Tractor chassis track width	2.51 m (8.25 ft)
M	Distance between lights	2.30 m (7.55 ft)
N	Height of lights	1.29 m (4.23 ft)
R	Reflector height	0.35 m (1.15 ft)
S	Distance between reflectors	2.08 m (6.83 ft)
* Machine attachment point (cat. 2) with the main frame horizontal.		



Dimensions

Work position		[m]
L_W	Length in work position	L_T
H_W	Height in work position	1.79 (5.88 ft)
W_W	Width in work position	7.00 - 7.80 m (23.0 - 25.6 ft)
X	Distance between the rotors	0.30 - 1.10 (1.00 - 3.60 ft)



Weights

Weights		[kg]
M_M	Total weight according to EC Directive 2006/42/EC	1510 kg (3329 lbs)
M_{EU}	Technical total weight according to EU Regulation 167/2013. Total axle loads on the transport chassis	915 kg (2018 lbs)
H_L	Supported load on the 2-point attachment carrier. (category 2)	595 kg (1312 lbs)

Tractor equipment required

Output / connections		
	Minimum output of the tractor	35 kW (47 hp)
	Power supply	Lighting equipment: 12 V, 7-pin plug socket ISO 1724 Pilotbox [+] 12 V, 3-pin plug socket DIN 9680
	Hydraulic connections	1 x single-acting hydraulic control device with floating position
	Hydraulic pressure	150 - 210 bar (2175 - 3046 psi)
	Maximum PTO shaft speed	540 rpm
	Coupling device	2-point attachment carrier (category 2) Fixable laterally

Machine equipment

Swath deposit		
	Swath former with auto-swivel	Standard
Rotors/tine supports/tines		
	Number of rotors	2
	Number of tine supports per rotor	10 CCW deliveries 10 CW deliveries
	Number of tines per tine support	4
	Removable tine supports	No
	Tine guard	6
	Rotor height adjustment	Mechanical
	Electro-hydraulic single lift [+]	[+]
	Tine saver	[+]
Wheels		
	Rotor chassis	16 x 6.50-8 6 PR
	Tandem axles on rotor chassis	[+]
	Transport chassis	10.0 / 75x15.3 10PR 15.0 / 55x17 10PR [+]
Safety accessories		
	Lighting equipment	Standard
	Warning signs	Standard
PTO shaft		
	PTO shaft with freewheel	Standard

Measurement of airborne sound emissions

The airborne sound emissions from the machine are below the levels stipulated by machinery directive 2006/42/EC.

- A-weighted sound level in the workplace:
  < 70 dB(A)
- Currently C-weighted sound level:
  < 63 Pa (130 dB based on 20 µPa)
- A-weighted sound level on the machine:
  < 80 dB(A).

Pilotbox [+]

Protect electrical parts against moisture
The electronic control system, pilotbox [+] and electrical plug connections must be protected against damp and penetrating moisture. Dampness in electronic devices can lead to leakage current, which results in malfunction.

The pilotbox [+] is an integral part of the optional electro-hydraulic control system [+]. The following functions can be selected and controlled using a single-acting hydraulic control device:

Preselection	Function
Pilotbox OFF	Raise and lower both rotors.
Pilotbox ON	Control LED lights up. The A and C functions are available.
	A: Raise and lower the left rotor.
	B: No function.
	C: Raise and lower the right rotor.

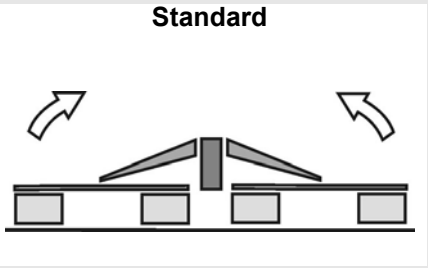
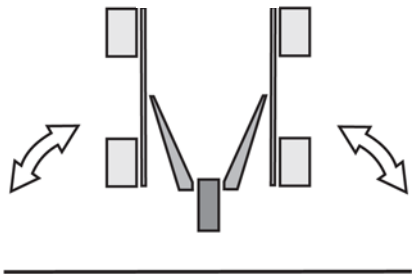
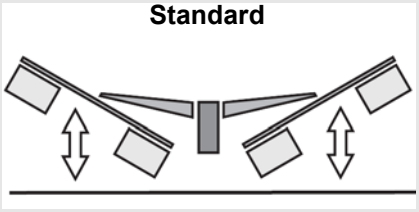
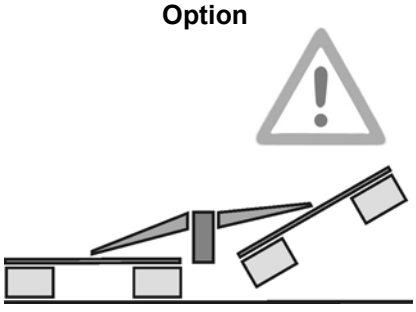
Operate the rotary rake with the pilotbox [+] as follows:

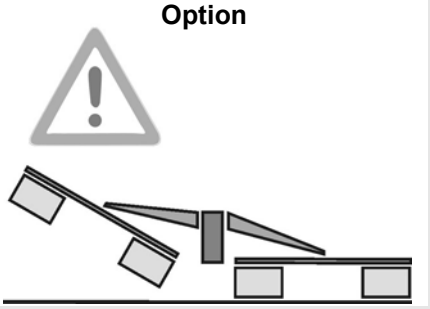
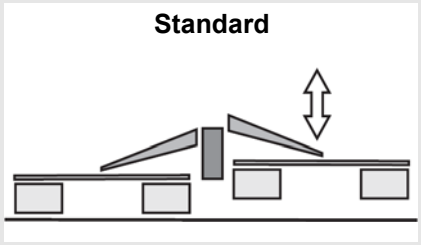
- Mount the pilotbox [+] in the tractor cab so that it is secure and easily reachable.
- Connect the plug for the 12 V power supply to the 3-pin plug socket on the tractor.
- Switch it on and off with the switch. The control LED lights up when the pilotbox [+] is switched on.
- With the switch, select the function (A, B or C) and then execute the function with the single-acting hydraulic control device.

Function overview

Standard version

The table below provides a summary of the functions. Be sure to follow the other instructions and note the safety information in the operator's manual.

Steering	Machine position	Function
• Single-acting hydraulic control device.	**Standard** 	**Transport** • Machine in work position. • Switch off the PTO shaft drive. • Clean the machine. • Lift the rotors into the transport position using the single-acting hydraulic control device.
• Single-acting hydraulic control device.	**Standard** 	**Work position** • Switch off the PTO shaft drive. • Use the single-acting hydraulic control device to release the lift arm locking mechanism. • Pull the rope on the mechanical lock and keep tensioned. • Fold the rotors in fully using the single-acting hydraulic control device.
• Single-acting hydraulic control device.	**Standard** 	**Headlands** • Using the single-acting hydraulic control device, raise both rotors to the headland position, then lower them.
• Pilotbox [+] is switched on. • Preselect position "A" on the pilotbox [+].  • Single-acting hydraulic control device.	**Option** 	**Swathing with left rotor [+]** • Preselect position "A" on the pilotbox [+]. • Using the single-acting hydraulic control device, raise the right rotor and then lower it.

Steering	Machine position	Function
• Pilotbox [+] is switched on. • Preselect position "C" on the pilotbox [+].  • Single-acting hydraulic control device.	**Option** 	**Swathing with the right rotor [+]** • Preselect position "C" on the pilotbox [+]. • Using the single-acting hydraulic control device, raise the left rotor and then lower it.
• Crank on left rotor.	**Standard** 	**Working depth of left rotor** • Switch off the PTO shaft drive. • Switch off the tractor and secure it. • Using the crank on the left rotor, set the rotor to the appropriate depth.
• Crank on right rotor.	**Standard** 	**Working depth of right rotor** • Switch off the PTO shaft drive. • Switch off the tractor and secure it. • Set the working depth using the crank on the right rotor.

Checking the scope of delivery

Delivery is in the fully assembled state
The machine is delivered fully assembled. Using the check list, check the loose parts on delivery. If any parts of the machine have not been fitted or are missing, please contact your dealer.

Do not assemble the machine yourself.
Trained personnel are required to assemble the machine. Do not perform assembly work yourself. The following points are required to be met for the machine to be in proper condition:

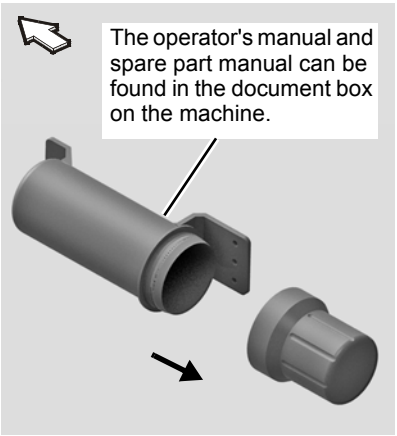
- Observance of a sequence of work steps.
- Compliance with tolerances and torques.
- Knowledge of work safety during assembly.

Incorrect assembly can result in damage to the machine or accidents.

If parts are missing or have been damaged during transportation, please inform the dealer, importer or manufacturer immediately.

Checklist for parts which were supplied loose	Quantity
PTO shaft for drive	1
PTO shaft for auxiliary drive	2
Tine support, CCW delivery	10
Tine supports, CW delivery	10
Tine guard	6
Swath former	1
Operator's manual	1
Spare part manual	1
Accessories	See delivery note

Operator's manual



The operator's manual belongs with the machine and must always be kept on board. A document box for the operator's manual and spare part manual is mounted on the main frame.

Checking the machine

Before using the machine for the first time, the alignment of the optional tandem axles [+], the PTO shaft length and the steering setting must be checked and corrected if necessary.

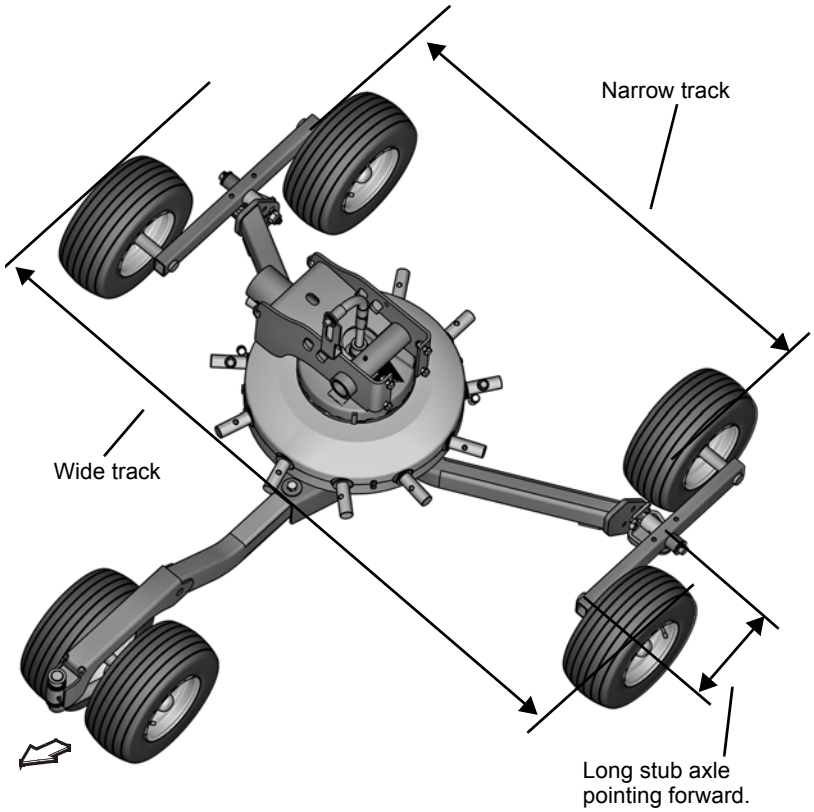
The following checks are described in this section:

- »Checking the tandem axles [+]«
- »Length of PTO shaft«
- »Steering«

Checking the tandem axles [+]

Ensure that the tandem axles are aligned correctly
Make sure that the tandem axles are aligned correctly. Incorrect assembly and alignment will damage the machine.

- Check that the tandem axles [+] are aligned correctly.
  - The wide track is at the front in relation to the direction of travel.
  - The narrow track is at the back in relation to the direction of travel.



Length of PTO shaft

The length of the PTO shaft was selected at the factory to suit almost all types of tractor. Only in exceptional cases is a correction of the PTO shaft length required on individual tractors. Check the length of the PTO shaft on each tractor prior to first use.

A manufacturer's operator's manual for the PTO shaft is enclosed. This includes detailed information on the relevant version of the PTO shaft and must be observed.

Safety

Switch off the tractor and secure it
Before you dismount:

- Lower all implements to the ground.
- Switch all operating controls to their neutral or park position.

- Switch off the tractor engine, put the parking brake in the park position, remove the ignition key and secure the tractor against rolling away.

An unsecured tractor can run you over or trap you. Serious or fatal injury may be caused as a result.

Check the angle of lock
The tractor's PTO shaft has a wide hinge joint, allowing an angle of lock of up to 80°. Make sure that the PTO shaft is not damaged during tight cornering. The machine may be damaged as a result.

Correct length
A PTO shaft that is too long must not be used. Damage to the drive bearings on the tractor and machine will be caused as a result.

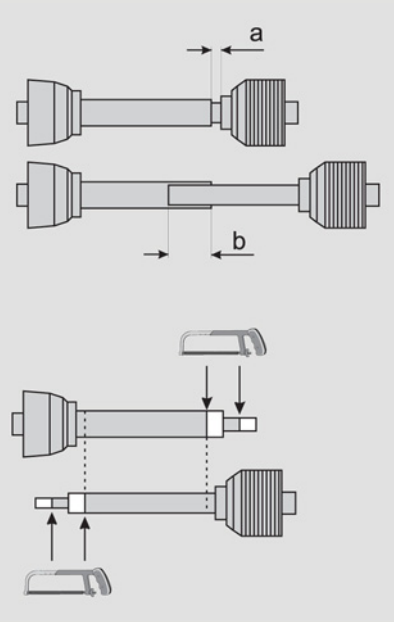
Checking the length of the PTO shaft

- Couple the machine to the tractor without the PTO shaft.
- Lower the tractor's lower link.
- Set the combination (tractor and machine) to the smallest steering angle.

- Switch off the tractor engine, put the parking brake in the park position, remove the ignition key and secure the tractor against rolling away.

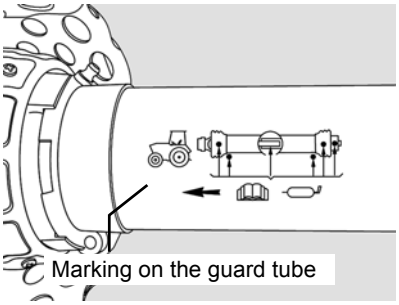
If the PTO shaft has been shortened, the minimum overlap and the minimum distance must be checked again when it is operated with another tractor.

Shortening the PTO shaft



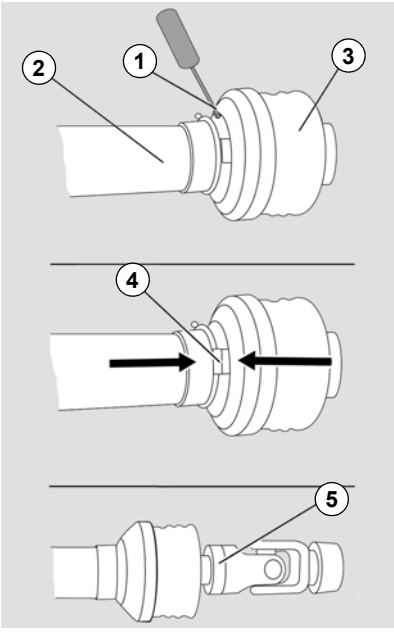
- Pull the PTO shaft apart and connect one half to the tractor PTO shaft drive and one to the machine and secure them.
- Place the two shaft halves next to each other and:
  - Check for a minimum of 250 mm (10 in) overlap (b).
  - Check that the PTO shaft does not block at one end (minimum clearance (a) = 20 mm (1 in)
- Shorten the slide tube and guard tube by the same dimension.
- Deburr the ends of the tubes.
- Remove the swarf.
- Grease the sliding surfaces well.

Fitting the PTO shaft


Marking on the guard tube

Make sure that you fit the PTO shaft in the correct installation position. There is a marking on the guard tube of the PTO shaft.

- Check the length of the PTO shaft and shorten it if necessary.
- Place the PTO shaft onto the PTO stub shaft of the machine.
- Secure the PTO shaft with a locking pin.



- Remove the locking screw (1) between the guard tube (2) and the guard cone (3).
- Twist the guard cone (3) and the guard tube (2) in opposite directions so that the "noses" of the slide ring (4) are positioned directly over the slots on the guard cone (3).
- Pull the guard cone (3) and guard tube (2) back until the single joint (5) is accessible.
- Connect the PTO shaft to the machine.
- Push the guard cone (3) and guard tube (2) back over the single joint (5).
- Tighten the locking screw (1).
- Secure the guard cone to the gear box using a jubilee clip.

Steering

Never carry out work on the steering
Contact your dealer if specifications differ. Never carry out any work on the steering or track yourself. This could cause traffic accidents and accidents with fatal consequences.

The following applies to all instructions below:

- Please note the following instructions and safety information:
- »Coupling the lower link«, page 38.
- »Coupling the PTO shaft«, page 40.

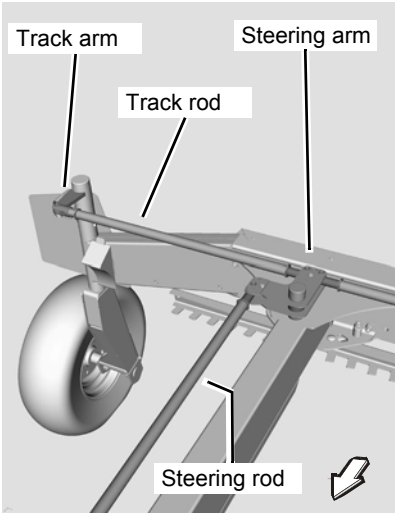
Checking the steering

The steering is fitted and calibrated in the factory. Check the adjustment of the steering with a hitched machine.

- Drive along a straight line with the entire combination (tractor with hitched machine). For example, a straight kerb.
- Check if the machine follows the tractor in the same track.

If the machine is pulled at an offset angle behind the tractor, the tracking must be checked and adjusted. This work must be carried out by a dealer.

Checking the track



If the machine rolls at an offset angle to the tractor when driving a straight line, the directional stability is set incorrectly. Proceed as follows:

- See chapter »Steering«, page 93.
- Consult your dealer. Never carry out any work on the steering or tracking yourself.

Safety

Observe the safety information
Disregard for safety information can lead to serious or fatal injury.
See chapter »Safety«, page 7.

Increased risk of injury
When the machine is being coupled to the tractor, there is an increased risk of injury. Therefore:

- Never stand between the tractor and machine.
- Secure the tractor against rolling away.
- Slowly and carefully actuate the tractor lower link.

Failure to observe these instructions can result in serious or fatal injury.

General

The machine is equipped at the factory for coupling to the lower link of the tractor (2-point attachment carrier).

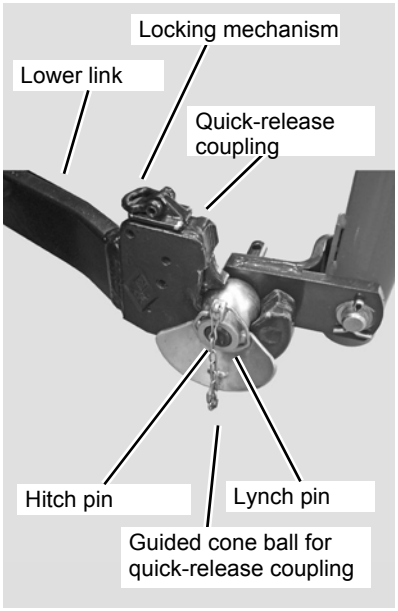
The following work steps are described in this section:

- »Coupling the lower link«
- »Swivelling in the parking stand«
- »Coupling the PTO shaft«
- »Wheel chocks«
- »Electrical connections«
- »Hydraulic connections«

Coupling the lower link

The machine can be used on tractors with lower link quick-release coupling and on tractors with no quick-release coupling.

Tractors with quick-release couplings



Follow the instructions for the quick-release coupling
Follow the instructions below for tractors with quick-release couplings. Also note the instructions and warnings in the operator's manual of the tractor manufacturer.
If this requirement is ignored, the consequence may be damage to the machine and even life-threatening injuries.

The following applies to tractors with quick-release couplings:

- Slide guided cone balls for the quick-release coupling that are suitable for the tractor onto the hitch pins of the machine.
- Secure the guided cone balls for the quick-release coupling with lynch pins.
- To couple the machine, raise the tractor lower link (rear power lift system) until the locking mechanism for the quick-release coupling locks in place.
- Secure the locking mechanism with pins.
- Follow the instructions for »Tractors without quick-release coupling«.

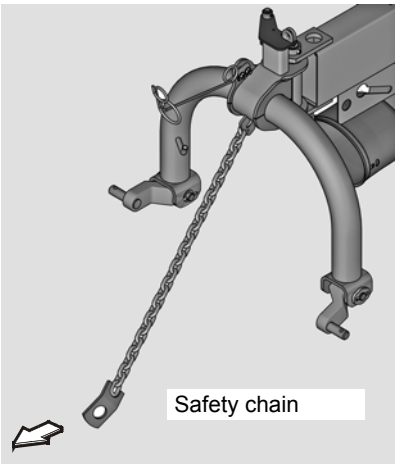
Tractors without quick-release coupling

The following applies to all tractors - with or without quick-release couplings:

- Couple the machine to the lower link - in accordance with the operator's manual of the tractor manufacturer - lift slightly and secure.
- Slightly raise the lower link.
- Secure the tractor against rolling away, shut off the engine and remove the ignition key.
- Swivel in the parking stand.
  → See »Swivelling in the parking stand«, page 39.
- With the lower link in the work position, lift it off the ground until the main frame of the machine is tilted approximately 1 degree forwards.
- Engage the lower link at the sides.
- Adjust the lower link such that a uniform ground clearance is maintained.

Safety chain

The safety chain is an auxiliary coupling which must be used for road transport if the machine has EU type approval.



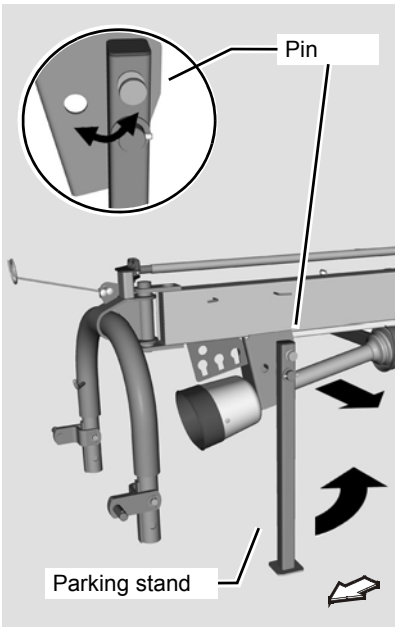
Safety chain
When travelling on the road, always connect the machine and the tractor using a safety chain. Use a safety chain with a strength that corresponds to at least the supported load of the machine. Otherwise, serious or fatal injuries would be caused as a result.

- Fasten the supplied safety chain between the tractor and the machine.

Choose an appropriate length of chain so that the movement of the drawbar is not adversely affected and the chain does not hang down too low.

Also observe the national regulations regarding the length and fitting of safety chains, as well as the tractor manufacturer's operating manual.

Swivelling in the parking stand

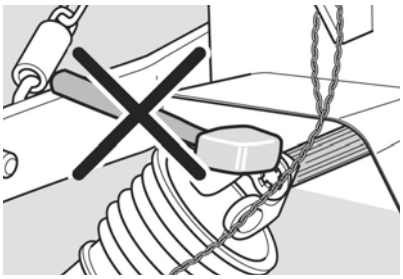


After coupling the machine to the tractor, swivel in and secure the parking stand.

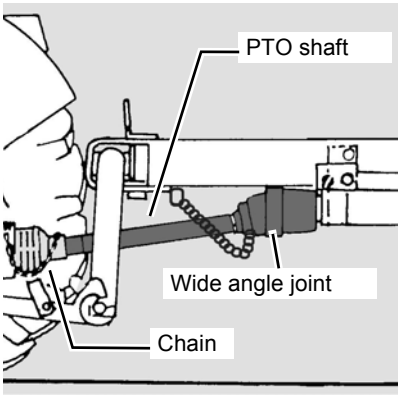
- Switch off the tractor engine, put the parking brake in the park position, remove the ignition key and secure the tractor against rolling away.
- Pull out the pins in the parking stand.
- Swivel in the parking stand.
- Undo the pins on the parking stand and engage them.

Coupling the PTO shaft

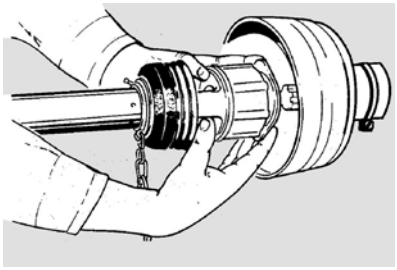
Make sure that you fit the PTO shaft in the correct installation position. There is a marking on the guard tube of the PTO shaft.



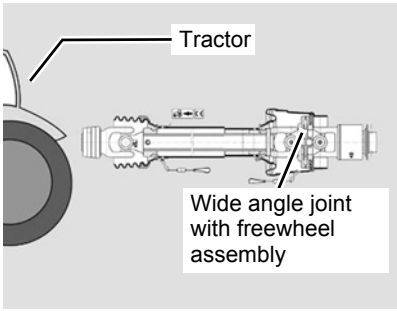
Do not use force
When coupling the PTO shaft, do not use a hammer or any similar tools. Using these types of tool can severely damage the PTO shaft. A damaged PTO shaft can cause damage to the tractor and the machine.



- Check whether the PTO shaft must be shortened before coupling.
- Shorten the PTO shaft if necessary.
  → »Length of PTO shaft«, page 34

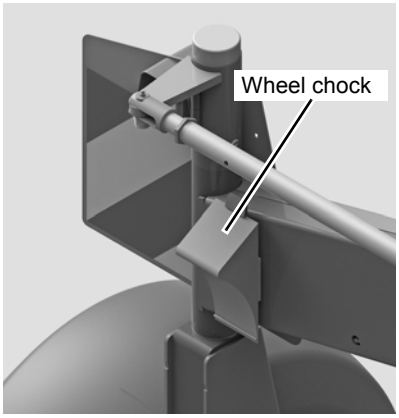


- Check that the tractor's PTO stub shaft is clean and lubricated.
- Couple the PTO shaft to the tractor and the machine.
- Ensure that the PTO shaft is engaged on the shaft ends.
- Secure the guard tubes so that they cannot rotate at the same time.



- Couple the wide-angle joint to the machine's PTO stub shaft.

Wheel chocks



Use wheel chocks
Never remove the wheel chocks from in front of the wheels if the tractor is not otherwise secured against rolling away. Persons could be run over by the machine or the tractor. Serious or fatal injury may be caused as a result.

- Switch off the tractor engine, put the parking brake in the park position, remove the ignition key and secure the tractor against rolling away.
- Remove the wheel chocks from in front of the wheels.
- Place them in the brackets provided on the left and right behind the warning plates on the transport chassis and engage them securely.

Connections

Electrical connections

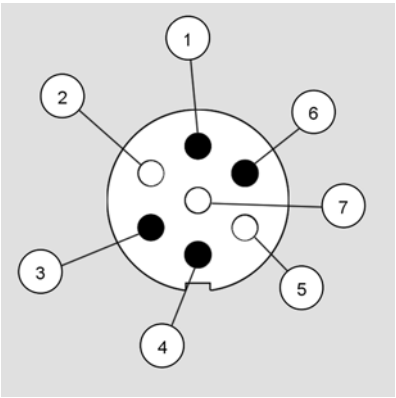
Checking the electrical cables
Check the electrical cables. The electrical cables must not chafe or hang loose. Electrical cables that have been torn away or worn through must be replaced. Otherwise, damage to the machine may be caused as a result.

Attach the following electrical cables to the tractor:

Lighting equipment

- Connect the plug for the 12 V power supply to the 7-pin plug socket on the tractor.

ISO 1724 plug arrangement



A connection in accordance with ISO 1724 must be present on the tractor. If your tractor does not have the corresponding connection, a corresponding connection must be retrofitted. Consult your dealer.

PIN	Cable	Connection to
1	Yellow	Left-hand indicator (amber)
2		Not used
3	White	Earth; all lights
4	Green	Right-hand indicator (amber)
5	Brown	Right rear light (red)/right position light (white)
6	Red	Brake lights
7	Black	Left rear light (red)/left position light (white)

Pilotbox [+]

Switch off the pilotbox for all tasks on the machine
Always switch off the pilotbox when coupling or uncoupling and when carrying out service or maintenance work or any task on the machine. If the pilotbox is switched on and accidentally actuated, unpredictable movements of the machine may be triggered. Accidents with serious or fatal injuries may be caused as a result.

- Mount the pilotbox in the driver's cab so that it is secure and easily reachable.

- Connect the plug for the 12 V power supply to the 3-pin plug socket on the tractor.

Pilotbox	Solenoid valve connection	Function
A	Y1	Raise and lower the left-hand lift arm.
B	Y2	No function
C	Y3	Raise and lower the right-hand lift arm.

The pilotbox is not included in the scope of delivery for the standard version. The pilotbox [+] is an integral part of the optional electro-hydraulic control system [+].

Hydraulic connections

Check hoses and couplings
Check all hydraulic hoses for damage before connecting them. Check all hydraulic couplings for firm seating after connecting them. Defective hydraulic hoses and poorly fitting hydraulic connections can trigger unpredictable movements of the machine, causing severe damage to the machine as well as personal injury. Serious or fatal injury may be caused as a result.

Secure the tractor's control devices
In the transport position, secure the control devices on the tractor against unintended actuation and lock them if possible. Unintentional activation of a control device can trigger unpredictable movements of the machine and cause serious machine damage and personal injury. Serious or fatal injury may be caused as a result.

Check the routing of the hydraulic hoses
Close or disconnect the quick couplings with great care. Remove any dirt or air which has entered the hydraulic system. The hydraulic system may otherwise be seriously damaged. Material damage or personal injury may be caused as a result.

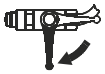
Hydraulic connection at zero pressure only
Only connect hydraulic hoses to the tractor hydraulic system if the tractor and machine hydraulic system is at zero pressure. A hydraulic system which is under pressure can cause unforeseen movements on the machine. Serious or fatal injury may be caused as a result.

Avoid mixing oils
If the machine is used on different tractors, an impermissible mixing of oil may occur. Impermissible oil mixtures can irreparably damage tractor components.

High pressures in the hydraulic system
The hydraulic system is under high pressure. Regularly check all lines, hoses, and screwed connections for leaks and externally visible damage. Never use your hands to search for suspected leaks. Only use suitable tools when looking for leaks. Rectify any damage immediately. Fluid escaping under pressure can penetrate skin may result in injuries and fires. Seek medical attention immediately if injuries occur.

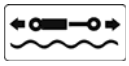
Connecting the hydraulic couplings

Connect the hydraulics correctly
Ensure that the hydraulic system is connected correctly. Otherwise, injuries and damage to the machine may be caused as a result.



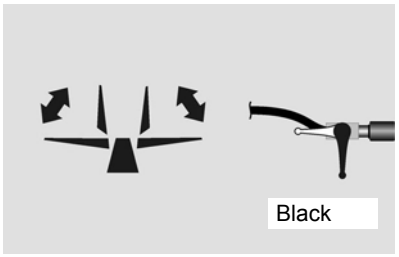
- Close the ball valve.
- Set the tractor hydraulics to “free float”.

- Switch off the tractor engine, put the parking brake in the park position, remove the ignition key and secure the tractor against rolling away.
- Roll up the control ropes and store them in the tractor cab.

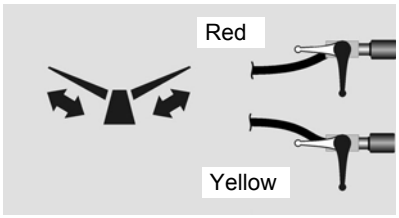


- Connect the machine's hydraulic coupling to the single-acting hydraulic control device when it is set to the floating position.
- Connect the machine's hydraulic coupling to the double-acting hydraulic control device.

Standard version



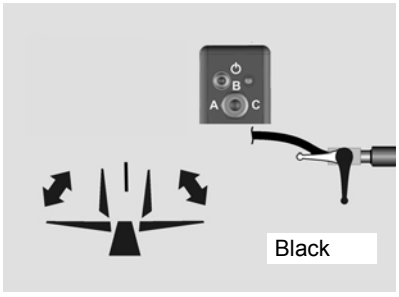
The rotors are raised and lowered via the single-acting hydraulic control device.



The swath width is controlled using the double-acting control device.

Hydraulic line	Marking
Pressure line	Red
Return line	Yellow

Electro-hydraulic control system[+]



The rotors are raised and lowered via the single-acting hydraulic control device. Single swath operation is controlled by switching on and actuating the pilotbox.

Hydraulic line	Marking
Single-acting hydraulic control device pressure line	Black

Safety

The following applies to all preparations for operation:

Observe the safety information
Disregard for safety information can lead to serious or fatal injury. See chapter »Safety«, page 7.

Secure the machine
Secure the machine against accidental starting and rolling away. Use wheel chocks. The machine must stand on a level, firm and secure surface and be supported during the work, if necessary. Unsecured or non-supported machines can cause accidents. Serious or fatal injury may be caused as a result.

No persons in the working area
Ensure that no persons – children in particular – are present in the slewing and working area of the machine. Persons could be caught by the machine within this area. This could result in fatal injury.

Avoid the hazard area
The rotors are considered a hazard area. Do not stand in the hazard area. The rotors may lower or turn. This can lead to serious or fatal injuries.

Unfold fully and evenly
Ensure that the side devices are evenly unfolded. If there is a malfunction, fold the side devices back in and repeat the process at a higher engine speed. The hydraulic cylinders must be completely extended in the work position. Otherwise, the machine may be damaged.

General

The following applies when performing all adjustment work:

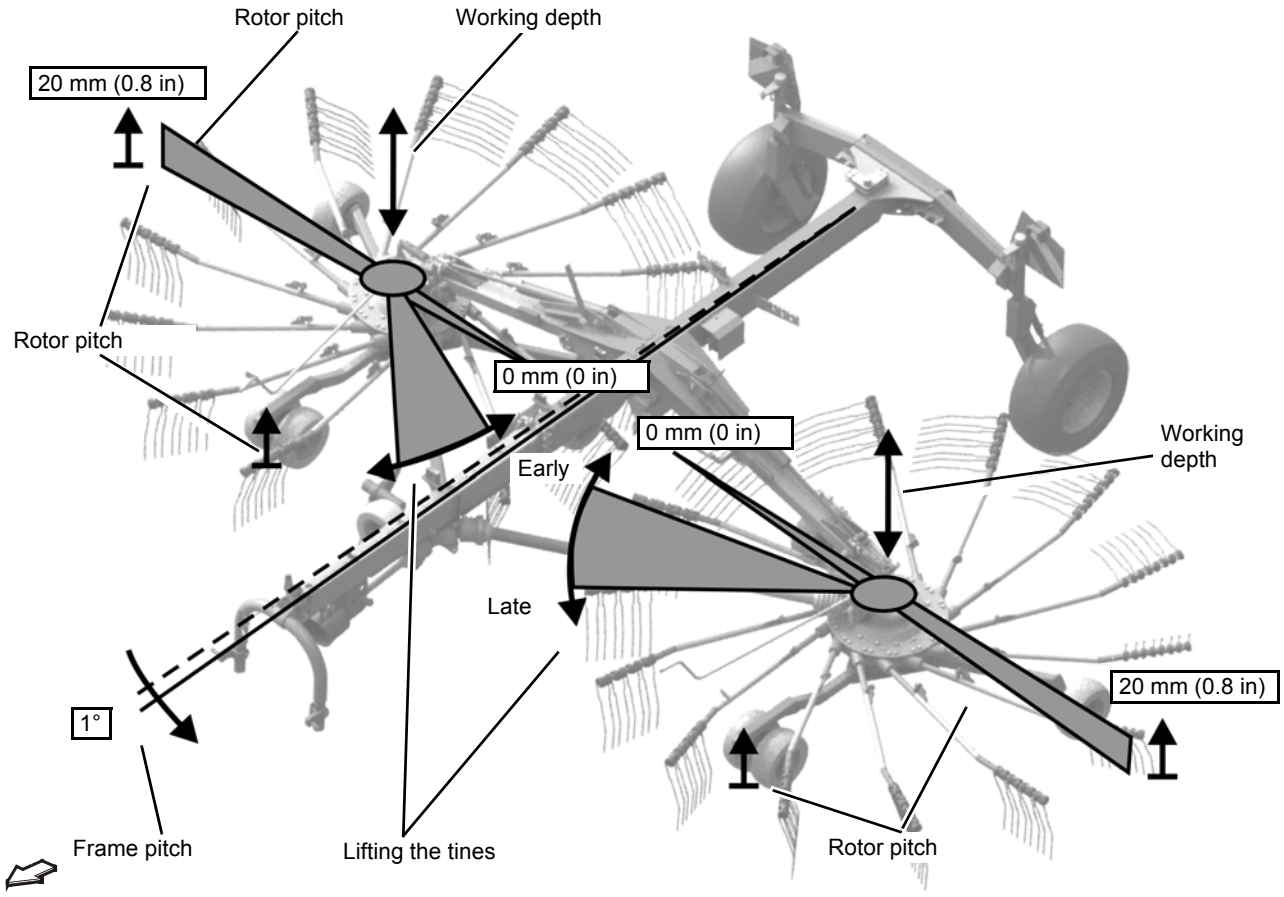
- Check the tyre pressures.
- Secure the machine.
- Lower the rotors into the work position.
- Undo appropriate bolts and/or screws.
- Make the required adjustment.
- Retighten the bolts.
- Fit and secure the tine supports.

The following work steps are described in this section:

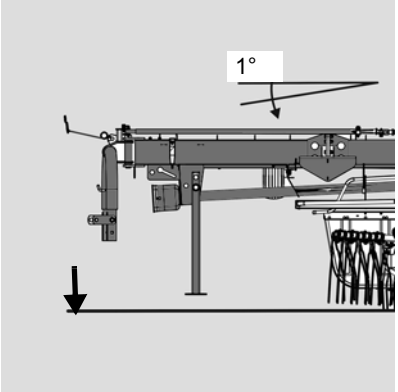
- »Rotor pitch«
- »Working depth«

Adjusting the machine

The machine is preset at the factory. The following illustration shows an overview of the basic settings. Detailed information can be found on the following pages.



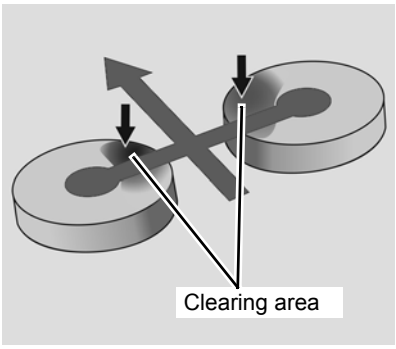
Frame pitch



For improved pick-up of the crop, use the lower link of the tractor to incline the main frame approx. 1° further to the front.

- Use the lower link of the tractor to incline the main frame approx. 1° further to the front.

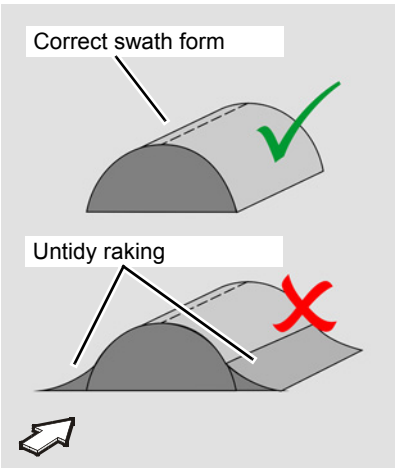
Rotor pitch



Close the ball valve
Close the ball valve before working on the machine or carrying out any adjustment work. If the ball valve is open and there is an operating error, the machine can lower itself and cause serious injuries.

The rotors are inclined transversely to the chassis. The rotor is already inclined obliquely ex-factory. If the crop is not picked up cleanly, the raking quality can be improved by adjusting the rotor pitch.

The optimum raking quality is achieved when the tips of the tines in the front working area and before the crop is deposited have the lowest possible ground clearance (see adjacent illustration).



The machine settings must be adjusted to suit the crop and the condition of the soil. If the machine is set incorrectly, this will make the work results untidy.

Reasons for untidy raking:

- Incorrect rotor pitch of the rotor chassis in the transverse axis.
- Incorrect rotor pitch of the rotor axle in the longitudinal axis.

Adjusting the rotor pitch

Secure the machine
Secure the machine against accidental starting and rolling away. Use wheel chocks. The machine must stand on a level, firm and secure surface and be supported during the work, if necessary. Unsecured or non-supported machines can cause accidents. Serious or fatal injury may be caused as a result.

- Raise the machine to the headland position using the hydraulic control device.
- Switch off the tractor engine, put the parking brake in the park position, remove the ignition key and secure the tractor against rolling away.
- Close the ball valve.
- Secure the rotors with suitable lifting accessories using supports.

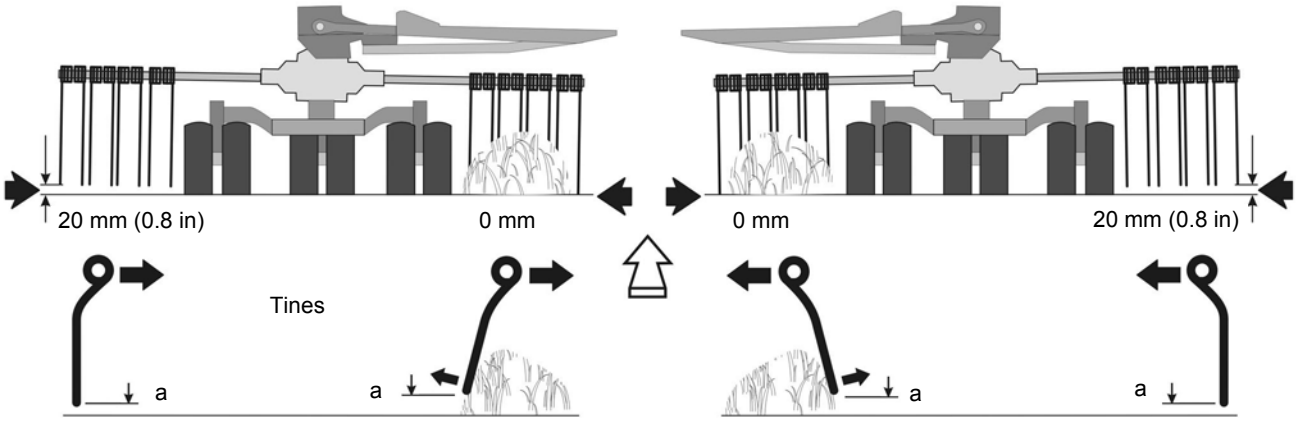
Then carry out one of the following steps:

- Adjust the rotor pitch for a single axle
  → »Adjusting the rotor pitch for a single axle«, page 50.

– or –

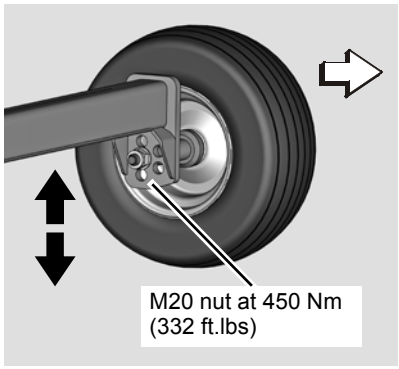
- Adjust the rotor pitch for a tandem axle [+]
  → »Adjusting the rotor pitch for a tandem axle [+]«, page 51.

Check the rotor pitch: the tines in the clearing area should lightly touch the ground.



Crop pickup increases the distance (a) between the tines and the ground.

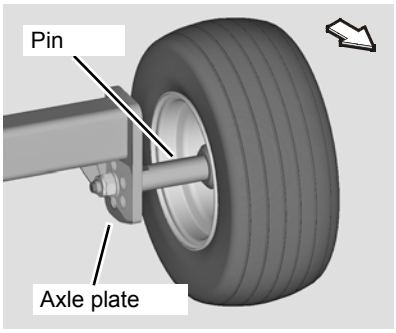
Adjusting the rotor pitch for a single axle



It is possible to tilt the position of the rotors laterally to the direction of travel.

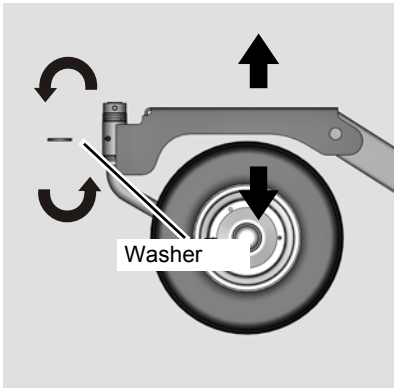
- Loosen the M 20 nut.
- Remove the M20 nut and washer.
- Remove the wheel.
- Fit the wheel in the desired position.
- Put the washer and M 20 nut back on.
- Tighten the M20 nut to 450 Nm (332 ft.lbs).

The inner wheels (on the swath former side) must be fitted one hole higher than the outer wheels.



Tighten the bolt to at least 450 Nm (332 ft.lbs). The axle plate must sit securely on the pin.

Setting the rotor pitch of the front axle



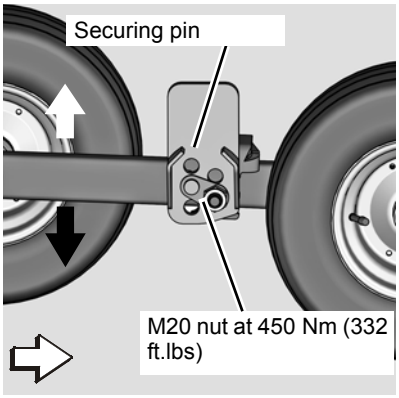
It is possible to tilt the position of the rotors in the direction of travel.

- Remove the dowel pin on the front axle.
- Adjust the height of the chassis by switching the position of the washers.
- Refit the dowel pin on the front axle.

Basic setting ex works:

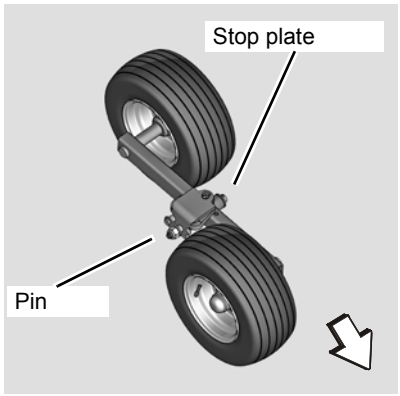
- 2 washers at the bottom of the pin in the front axle.

Adjusting the rotor pitch for a tandem axle [+]



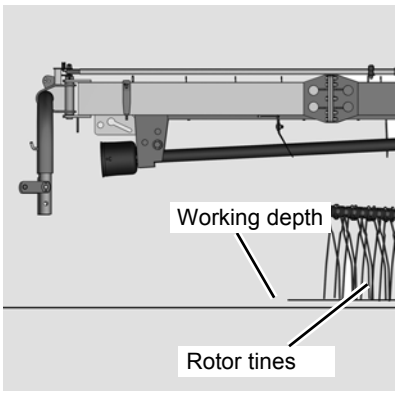
- Remove the M20 nut.
- Remove the tandem axle.
- Fit the tandem axle in the desired position.
- Fit the securing pin in the opposite hole.
- Tighten the M20 nut to 450 Nm (332 ft.lbs).

The inner tandem axle (on the swath former side) must be fitted one hole higher than the outer tandem axle so that the rotor on the swath former side is inclined.



Tighten the M20 nut to at least 450 Nm (332 ft.lbs). The axle plate must sit securely on the stop plate of the securing pin.

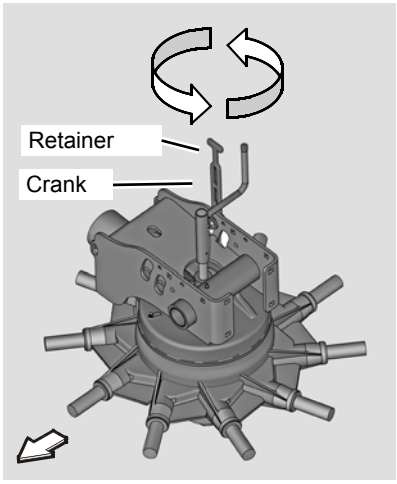
Working depth



Adjust the working depth as follows:

- Fully lower the machine into the floating position using the hydraulic control device and advance approximately 2 metres.
- Switch off the tractor engine, put the parking brake in the park position, remove the ignition key and secure the tractor against rolling away.
- Check the working depth to the ground.

Basic working depth setting



The working depth is set using the crank on the rotor.

- Release the crank retainer on the bearing housing and adjust the working depth by turning the crank.
  - Basic setting: the tines lightly touch the ground.
- After adjusting, secure the crank against turning using the retainer.
- Adjust the working width on the second rotor in the same way.
- Readjust the working depth to suit the field conditions if necessary.

Ten turns of the crank equate to a rotor tine height adjustment of about 15 mm (0.6 in). The thread is left-handed.

Further influencing factors for the working depth are:

- The soil condition and stubble length.
- The type and quantity of crop.

Tines that are set too low will soil the crop. The load on the rotor tines and the drive is increased.

Safety

Before transporting the machine on public roads, please read the following safety information. Compliance is mandatory and will help you to avoid accidents.

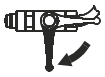
Observe the safety information
Disregard for safety information can lead to serious or fatal injury.
See chapter »Safety«, page 7.

Ensuring road safety
The machine must conform to current national traffic regulations if you intend to drive with it on public roads. Ensure the following:

- Lighting, warning and protective equipment must be fitted.
- The permissible transport widths and weights, axle loads, tyre load-bearing capacities, laden weights and national speed restrictions must be complied with.
- The maximum permissible road transport speed must be complied with, but not exceed 40 km/h (25 mph).
- Before driving on public roads, fold in all guard bars and rotors and secure the machine. All tine supports which have tips that point at right angles to the direction of travel and which are at a height of less than 2 metres (6.6 ft) must be safeguarded using the tine covers provided.
- The machine should only be towed by agricultural or forestry tractors.
- The empty weight of the tractor must be greater than the weight of the machine.

The driver and keeper of the vehicle are liable should these conditions not be observed.

Observe transport width
Observe the permissible transport widths. Put the machine in the transport position and attach lights, warning signs and protective equipment. The driver and keeper of the vehicle are liable for any non-compliance with national traffic regulations.



Close the ball valve
Close the ball valve before driving on the road. If the ball valve is open and there is an operating error, the machine may drop or swing out unexpectedly. This can result in traffic accidents and accidents causing serious or fatal injuries.

Switch off the pilotbox during road transport
Always switch off the pilotbox when travelling on public roads and tracks. If the pilotbox is switched on, unpredictable movements of the machine may be triggered. Accidents with serious or fatal injuries may be caused as a result.

Secure the tractor's hydraulic control devices
In the transport position, secure the control devices on the tractor against unintended actuation and lock them if possible. Unintentional activation of a control device can trigger unpredictable movements of the machine and cause serious machine damage and personal injury. Serious or fatal injury may be caused as a result.

Observe the contour of the terrain
Move the machine onto ground that is as flat as possible before changing from the work position to the transport position. Avoid inclines on which the combination (tractor and machine) could slip or overturn. There is an increased risk of tipping and injury in a position at right angles to the direction of the slope.

Clean lighting equipment before travelling on the road
All lighting equipment must be cleaned before road transport. Crop residue or dirt may cover up the lighting equipment and adversely affect its correct operation. This can result in traffic accidents and accidents causing serious or fatal injuries.

Clean the machine before travelling on the road
Before travelling on the road, remove all coarse dirt, crop residues and clods of earth from the machine and clean it. Crops or dirt that drop onto the road can cause slippery road conditions. Traffic accidents and accidents with fatal injuries may be caused as a result.

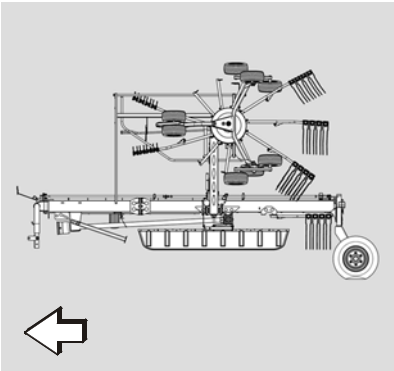
Protect the tines
When driving with the machine on public roads and in the park position, all tine supports must be secured using the tine covers provided. This can result in traffic accidents and accidents causing serious or fatal injuries.

General

The following work steps are described in this section:

- »Prior to road transport«
- »Lifting the rotors into the transport position«
- »Checking the machine«
- »Road transport«

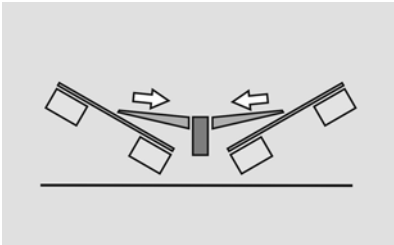
Prior to road transport



When driving on public roads, the machine must be in the transport position. To prepare the machine for road transport, carry out the following steps:

- »Setting the lowest transport height«
- »Lifting the rotors into the transport position«
- »Attaching the tine cover«
- »Checking the machine«
- Move the machine onto ground that is as flat as possible before changing from the work position to the transport position.

Setting the lowest transport height



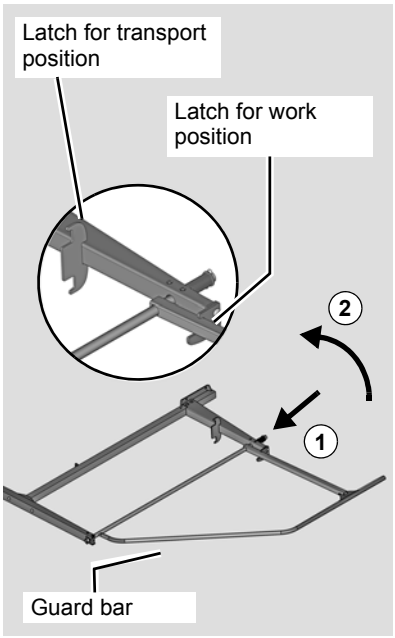
To obtain the lowest transport position, the lift arms must be fully retracted.

- Using the single-acting hydraulic control device, raise the machine to the headland position.
- Adjust the swath to the smallest width using the double-acting hydraulic control device.

With electro-hydraulic control system [+]

- Using the single-acting hydraulic control device, raise the machine to the headland position.
- Adjust the swath to the smallest width using the double-acting hydraulic control device.
- Switch on the pilotbox and set the 3-way switch to B.
- Lower the hydraulic transport chassis using the double-acting hydraulic control device.
- Switch the 3-way switch to the neutral position and switch off the pilotbox.

Folding in the guard bar

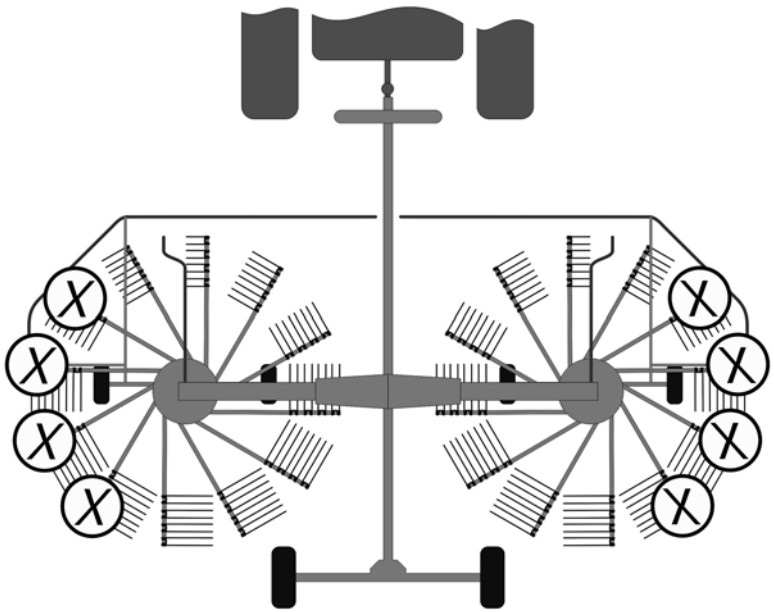


Before removing the tine supports, move all protective devices around the rotors from transport to work position, and lock them in place. Fold in the guard bar as follows:

- Lower the rotors into the work position using the single-acting hydraulic control device.
- Switch off the tractor engine, put the parking brake in the park position, remove the ignition key and secure the tractor against rolling away.
- (1) Release the guard bar by pulling it out of the latch for the work position.
- (2) Fold the guard bar through 180° and engage it in the latch for the transport position.

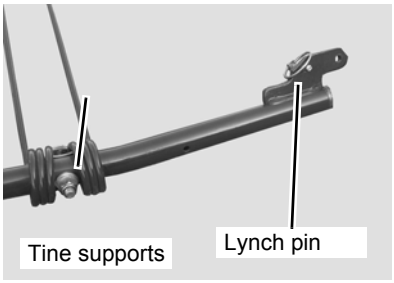
Removing the outer tine supports

- Remove any crop residues and coarse dirt.
- Remove the 4 outer tine supports from both rotors, plug them into the transport holder and secure them (see following illustration).

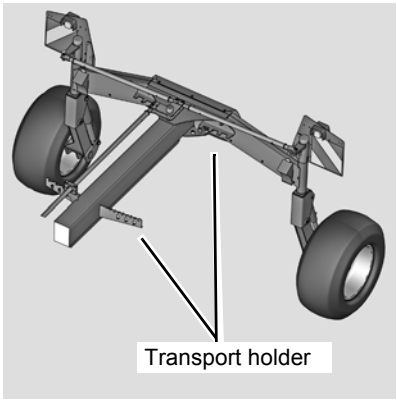


Placing outer tine supports in the transport holder

Switch off the tractor and secure it
Switch off the tractor, remove the ignition key, and secure the tractor against rolling away. An unsecured tractor can run you over or trap you. Serious or fatal injury may be caused as a result.



- Loosen and remove the lynch pin from the tine support.
- Secure the lynch pin in the rear hole of the tine support.
- Pull off the tine support.

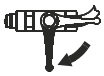


- Insert the tine support into the transport holder.
- Secure the tine supports with lynch pins.

- Switch on the tractor engine.
- Lift the rotors into the transport position.

→ See »Lifting the rotors into the transport position«, page 58.

- Switch off the tractor engine, put the parking brake in the park position, remove the ignition key and secure the tractor against rolling away.

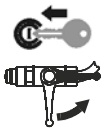


- Close the ball valve.

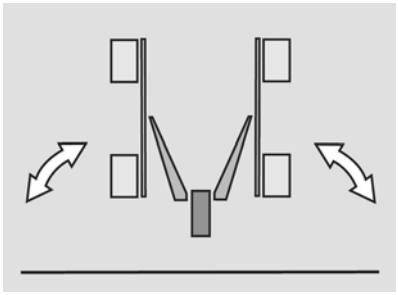
Lifting the rotors into the transport position

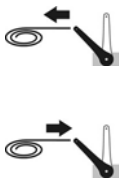
No persons within the slewing range
Ensure that no persons – children in particular – are present in the slewing and working area of the machine. Persons can be trapped by the machine. Serious or fatal injury may be caused as a result.

Make sure the machine is standing level
Before changing from the transport to the work position (and vice versa), make sure the machine is standing level. The machine could tip over, particularly on hillside locations. Otherwise, damage to the machine and serious or fatal injury may be caused as a result.

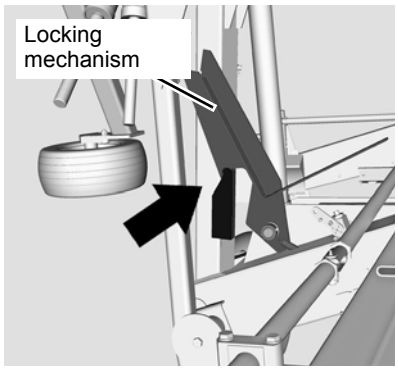


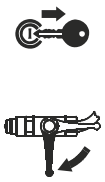
- Observe the instructions in »Prior to road transport«, page 55.
- Switch on the tractor.
- Open the ball valve.
- Set the lowest transport height.
  → See »Setting the lowest transport height«, page 55.





- Pull the rope on the mechanical lock and keep tensioned.
- Lift the rotors into the transport position using the single-acting hydraulic control device.
- Release the mechanical lock rope to secure the rotors.



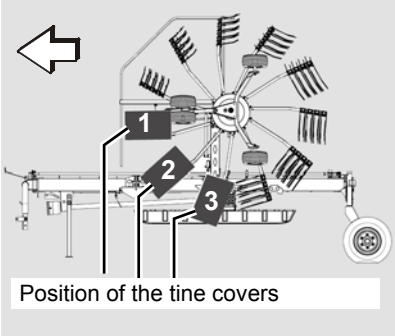


- Check that the locks of both lifting arms are engaged.
- Switch off the tractor engine, put the parking brake in the park position, remove the ignition key and secure the tractor against rolling away.
- Close the ball valve.

Before swivelling the rotors into the transport position, switch off the PTO shaft drive and wait for the rotors to come to a stop.

Attaching the tine cover

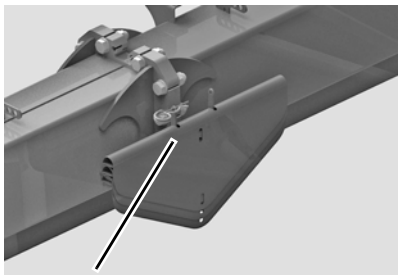
Exercise caution when close to unprotected tines
Maintain a sufficiently safe distance from exposed tines. When working in the vicinity of the tines, ensure that you have a firm footing (risk of slipping on wet ground). Serious or fatal injury may be caused as a result.



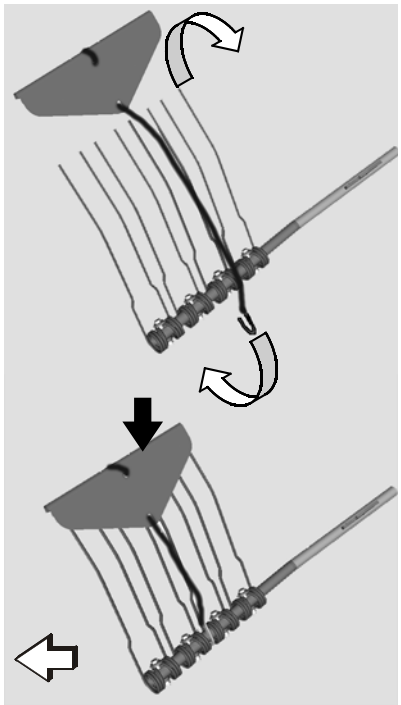
Position of the tine covers

All tine supports which have tips that point at right angles to the direction of travel and which are at a height of less than 2 metres (6.6 ft) must be safeguarded using the tine covers provided.

- On each side of the machine, fit the tine covers on the three tine supports.


Tine cover holder

The tine covers are stowed in the two holders on the left and right of the main frame.



Proceed as follows to complete the assembly:

- Take a tine cover from the holder.
- Fit the tine cover on the tine support.
- Fit all tine covers on the tine supports provided.

Checking the machine

Prior to driving on the road, check the machine against the check list:

- ☑ PTO shaft drive off?
- ☑ Rotor in transport position?
- ☑ Tine covers attached?
- ☑ Tine supports in the transport holder and secured?
- ☑ Tyre pressure correct?
- ☑ Lower link secured at the sides?
- ☑ Crop residues and dirt removed?
- ☑ Lighting cable routed so that it is not strained and cannot become caught in the tractor's wheels when cornering?
- ☑ Lighting equipment in good working order?

Road transport

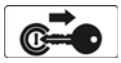
Follow the instructions below for road transport. Otherwise, traffic accidents and accidents with fatal injuries may be caused as a result.

- Before pulling away, check the immediate vicinity. Always make sure that you have a clear field of vision and, in particular, look out for children within the operating area of the machine.
- When the vehicle is in motion, lock the control devices on tractor.
- Do not transport people or objects on the machine.
- Adjust your speed to road conditions.
- Do not exceed a maximum speed of 40 km/h (25 mph). Comply with the national speed limits.
- Ensure sufficient steering and braking capability. Driving characteristics, steering, and braking capability are all influenced if the machine is coupled (increased braking distance as a result of greater inertia).
- There is a danger of tipping on slopes and if corners are taken too fast. Ensure that you drive in a careful manner, which is adapted to the road conditions.

Safety

The following applies for all preparations on the field:

Observe the safety information
Disregard for safety information can lead to serious or fatal injury. See chapter »Safety«, page 7.

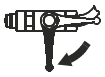


Switch off the tractor and secure it
Before you dismount:

- Switch off the PTO shaft drive.
- Lower all implements to the ground.
- Switch all operating controls to their neutral or park position.
- Put the tractor's parking brake into the park position.
- Switch off the tractor.
- Remove the ignition key.
- Secure the tractor against rolling away.

An unsecured tractor can run you over or trap you. Serious or fatal injury may be caused as a result.

Avoid the hazard area
The rotors are considered a hazard area. Do not stand in the hazard area. The rotors may lower or turn. Serious or fatal injury may be caused as a result.



Close the ball valve
Close the ball valve before adjusting. If the ball valve is open and there is an operating error, the machine may drop or swing out unexpectedly. Damage to the machine or accidents with serious or fatal injuries may be caused as a result.

Secure the machine
Secure the machine against accidental starting and rolling away. Use wheel chocks. The machine must stand on a level, firm and secure surface and be supported during the work, if necessary. Unsecured or non-supported machines can cause accidents. Serious or fatal injury may be caused as a result.

No persons in the working area
Ensure that no persons – children in particular – are present in the slewing and working area of the machine. Persons could be caught by the machine within this area. This could result in fatal injury.

Observe the slewing process
Observe the rotors during the slewing process. If the machine behaves unusually during the process, stop immediately to avoid damage.

Change the swath width in the headland position
When the rotors are extended with the machine at a standstill, the tines must not be in contact with the ground. Only change the swath width in the headland position. Otherwise, the machine may be damaged.

General

The following work steps are described in this section:

- »Lowering the rotors into the work position«
- »Removing the tine covers«
- »Adjusting the swath former«

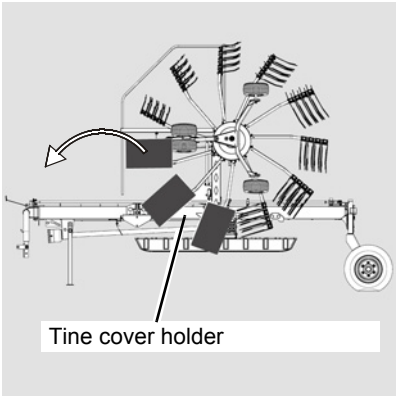
Lowering the rotors into the work position

After road transport, the machine is brought into the work position on the field. Follow the handling instructions below:

Shutting the machine down

- Place the machine onto ground that is as flat as possible.
- Switch off the tractor engine, put the parking brake in the park position, remove the ignition key and secure the tractor against rolling away.

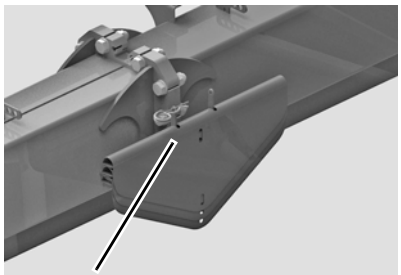
Removing the tine covers



Tine cover holder

Firmly secure the accessories
Accessories not in use must always be stowed and secured in the holders provided. When the machine is in motion, unsecured accessories can come loose. Damage to the machine and serious or fatal injury may be caused as a result.

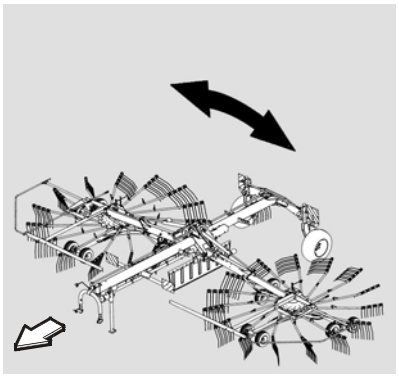
- Remove all of the tine covers.



Tine cover holder

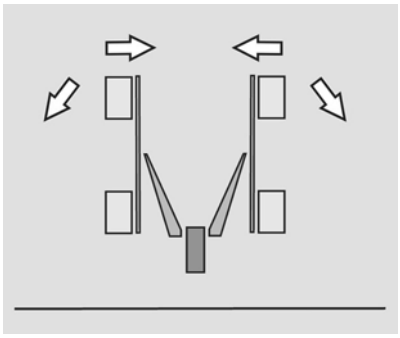
- Place the tine covers in the two holders on the left and right of the main frame.
- Secure the tine covers in the holder with safety splints.

Lowering the rotors

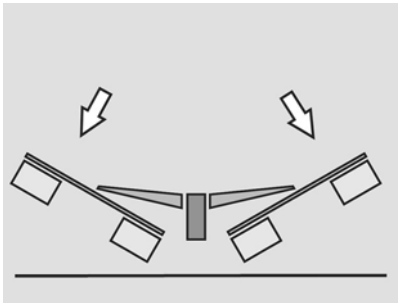


No persons in the working area
Ensure that no persons – children in particular – are present in the slewing and working area of the machine. Persons could be caught by the machine within this area. This could result in fatal injury.

- Place the machine onto ground that is as flat as possible.
- Switch on the tractor engine.

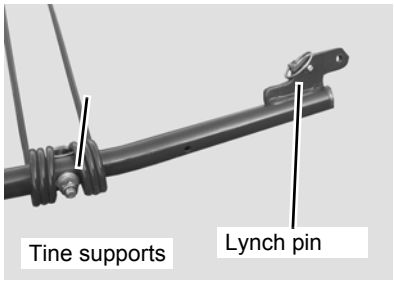


- Release the lift arm locking mechanism using the single-acting hydraulic control device.
- Pull the rope on the mechanical lock and keep tensioned.

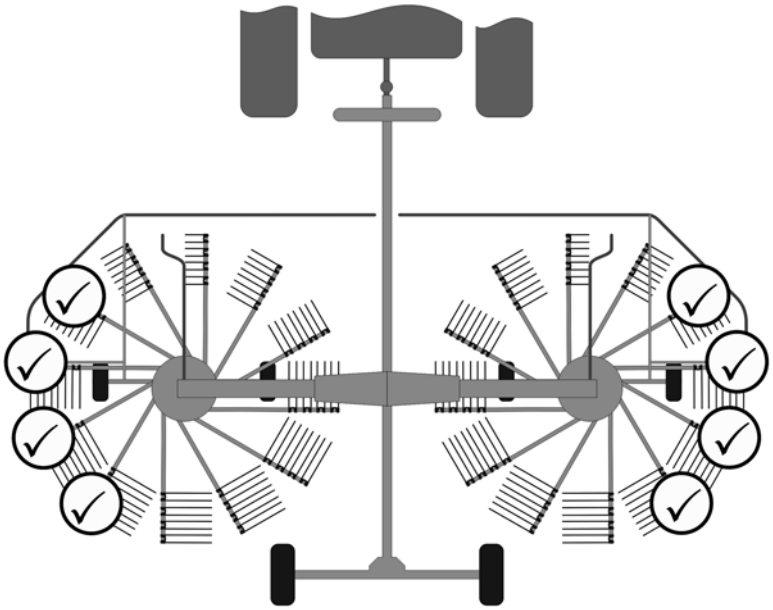


- Lower the rotors into the work position using the single-acting hydraulic control device.
- Release the mechanical lock rope.
- Switch off the tractor engine, put the parking brake in the park position, remove the ignition key and secure the tractor against rolling away.

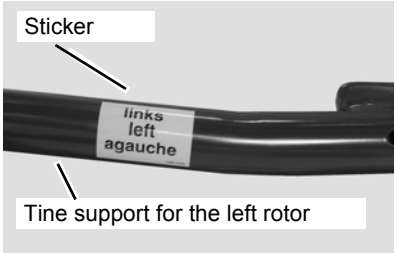
Fitting the outer tine supports



- Remove the tine supports for both rotors from the transport holder and fit them (see illustration below).
- Secure the tine supports with lynch pins.

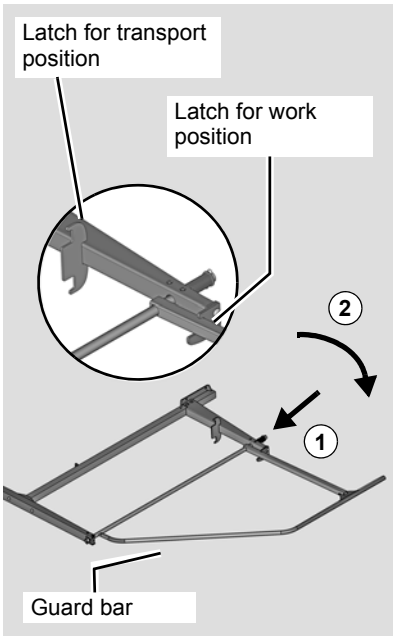


- Move the guard bar to the work position until the latch engages.
  → See »Folding out the guard bar«, page 66.
- Switch on the tractor engine.
- Observe the instructions in chapter »Preparing for use«, section »Working depth« on page 52.



- The tine supports for the left rotor are labelled.
- The tine supports for the right rotor are not labelled.

Folding out the guard bar



After the tine supports have been attached, all protective devices must be moved from transport to work position.

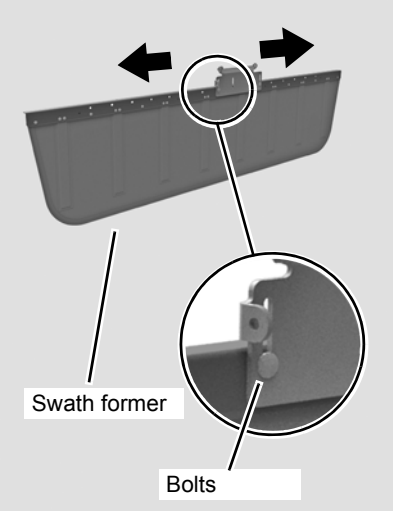
Fold out the guard bar as follows:

- (1) Release the guard bar by pulling it out of the latch for the transport position.
- (2) Fold the guard bar through 180° and engage it in the latch for the work position.

Adjusting the swath former

The swath former is folded into the correct position when changing from the transport to the work position.

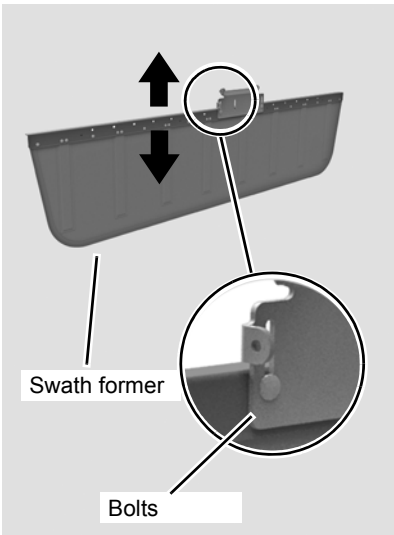
Adjusting the swath former in relation to the direction of travel



It is possible to adjust the direction of travel of the swath former as follows:

- Remove both screws from the holder.
- Move the swath former into the desired position.
- Fit the bolts and tighten them in the new position.

Adjusting the swath former's height



It is possible to adjust the height of the swath former as follows:

- Undo both screws on the holder.
- Adjust the height of the swath former.
- Tighten the bolts in the new position.

Safety

Observe the safety information
Observe the safety information. Disregard for safety information can lead to serious or fatal injury. See chapter »Safety«, page 7.

No riding on the machine
Persons or objects must never be transported on the machine. Carrying passengers – particularly children – on the machine is life-threatening and prohibited. Serious or fatal injury may be caused as a result.

No persons in the working area
Ensure that no persons – children in particular – are present in the slewing and working area of the machine. Persons could be caught by the machine within this area. This could result in fatal injury.

Maximum PTO stub shaft speed 540 rpm
The PTO stub shaft speed must not exceed 540 rpm and must be adapted to the condition of the crop. Higher revolution rates can cause damage to the machine.

Only allow the PTO shaft clutch to respond for a short time
Do not allow the slip clutch to respond for longer than 3 seconds. If the clutch responds for a longer period of time, it will become worn and the disconnect torque will drop.

Do not compress the PTO shaft
The PTO shaft between the tractor and machine must not be compressed when in the work position or transport position. If compressed, PTO shafts can cause damage to the machine and tractor.

Observe the contour of the terrain
Pay even more attention when driving on an incline. Avoid inclines on which the combination (tractor and machine) could slip or overturn. There is an increased risk of tipping and injury in a position at right angles to the direction of the slope.

Changes in the centre of gravity
The machine's centre of gravity changes in the single rotor work position. Pay even more attention when driving on an incline. Avoid inclines on which the combination (tractor and machine) could slip or overturn. There is an increased risk of tipping and injury in a position at right angles to the direction of the slope.

General

The following work steps are described in this section:

- »Swathing«
- »Dual rotor operation«
- »Adjusting the swath width«
- »Single rotor operation with electro-hydraulic control system [+]«
- »Driving on headlands«

Suitable working speeds
Select a driving speed (approx. 4 to 12 km/h / 2.5 to 7.5 mph) at which the crop is picked up cleanly and completely. The working speed depends on the machine settings and the particular crop.

Swath width
The swath width depends on working width, working speed, tine lift settings and transverse rotor pitch as well as crop condition.

The swath width is between approx. 1.20 m and approx. 2.00 m (3.94 and 6.56 ft).

Swathing

No persons in the working area
Ensure that no persons – children in particular – are present in the slewing and working area of the machine. Persons could be caught by the machine within this area. This could result in fatal injury.

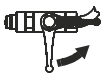
Requirements

After setting the machine as described in chapter »Preparations on the field« page 61, you can start swathing.

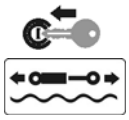
The machine is set correctly as follows:

- Swath former adjusted.
- Tine covers removed.
- Tine supports on the rotor correctly fitted and secured.
- Adjust the lowering speed for the tractor hydraulics so that the machine is not damaged while setting it down.
- Machine in work position.

Starting work



- Open the ball valve.
- Check that there is nobody in the working area of the machine.
- Switch on the tractor engine.



- Set the single-acting hydraulic control device to the floating position.

- Switch on the PTO shaft at a low engine speed.
- Slowly increase the speed.
  Do not exceed the maximum speed of 540 rpm.
- Select a driving speed at which the crop is picked up cleanly and completely.

Start swathing at the edge of the field and at headlands to avoid subsequently driving over the crop.

The slip clutch of the machine may also respond at low speed if resistance is increased due to excess crop or obstacles.

Working speed

Avoid crossing over swathes
As a general rule, avoid crossing over swathes. The crop is distributed unevenly and the machine is subjected to abrupt stresses. Otherwise, damage to the machine may be caused as a result.

Allow ample space when driving around obstacles
Obstacles must be circumnavigated in good time and at a distance. Due to the large width and length of the machine, it reacts slowly and tends to overrun. Otherwise, damage to the machine may be caused as a result.

A constant working speed is essential for uniform crop processing. The working speed should be set between 4 and 12 km/h (between 2.5 and 7.5 mph). The working speed depends on ground and crop conditions.

- Select a working speed at which the crop is picked up cleanly and completely.

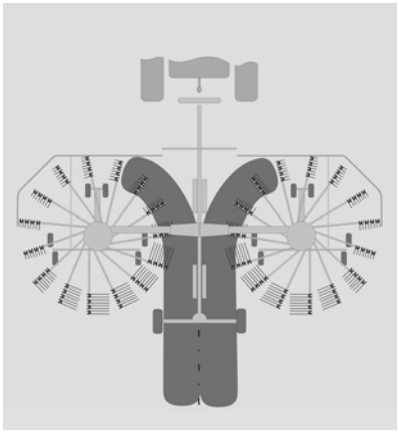
Swath deposit

Distance from the rotor
Maintain a safe distance from the rotor when it is rotating. Nobody may remain in close proximity to the machine when tedders and rakes are running. Serious or fatal injury may be caused as a result.

The following swath deposits are possible:

- »Dual rotor operation«, page 71.
- »Single rotor operation with electro-hydraulic control system [+]«, page 72.
- »Single swath with left rotor«, page 72.
- »Single swath with right rotor«, page 72.

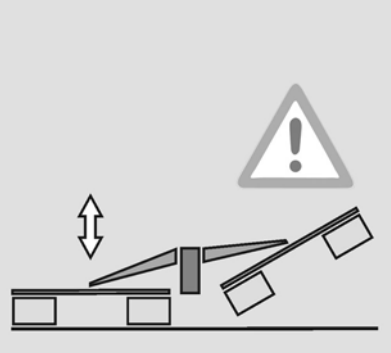
Dual rotor operation



Create a central swath with two rotors.

- Switch on the PTO shaft drive at low speed.
- Select a driving speed at which the crop is picked up cleanly and completely.

Single rotor operation with electro-hydraulic control system [+]



Distance from the rotor
Maintain a safe distance from the rotor when it is rotating. Nobody may remain in close proximity to the machine when tedders and rakes are running. Otherwise, serious or fatal injury may be caused as a result.

The optional single lift on the Hydro version makes it possible to deposit the crop using either the right or left rotor.

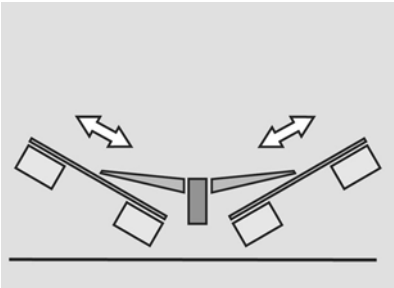
Single swath with left rotor

- Switch on the pilotbox and set the 3-way switch to C.
- Raise the right-hand rotor to the headland position using the single-acting hydraulic control device.
- Switch the 3-way switch to the neutral position and switch off the pilotbox.
- Select a driving speed at which the crop is picked up cleanly and completely.
  - The left rotor picks up the crop.

Single swath with right rotor

- Switch on the pilotbox and set the 3-way switch to “A”.
- Raise the left-hand rotor to the headland position using the single-acting hydraulic control device.
- Switch the 3-way switch to the neutral position and switch off the pilotbox.
- Select a driving speed at which the crop is picked up cleanly and completely.
  - The right rotor picks up the crop.

Adjusting the swath width

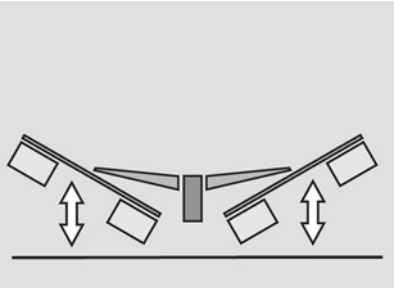


The swath width is adjusted by extending the rotors using the double-acting hydraulic control device.

For adjustment of the swath width, the machine should be in the headland position. Otherwise, the machine may be damaged.

- Raise the machine to the headland position using the single-acting hydraulic control device.
- Using the double-acting hydraulic control device, increase the pressure in order to extend the swath width.
- Using the double-acting hydraulic control device, decrease the pressure in order to reduce the swath width.

Driving on headlands



The rotors can be raised for crossing swaths that have already been harvested.

- Switch off the pilotbox.
- Using the double-acting hydraulic control device, raise the machine to the headland position.
- Lower the rotor again, in order to create new swath.

Check list for operation

☑ Guard bar folded down?

☑ All tine supports fitted and secured?

☑ Machine set correctly?

Safety

The following applies to all cleaning and care work:

Observe the safety information
Observe the safety information. Disregard for safety information can lead to serious or fatal injury. See chapter »Safety«, page 7.

Secure the machine

- Switch off the PTO shaft drive.
- Depressurise the hydraulic system.
- Whenever possible, uncouple the tractor.
- Switch all operating controls to their neutral or park position.
- Put the tractor's parking brake into the park position.

- Switch off the tractor and remove the ignition key.
- Ensure the machine is standing on firm, secure and level ground, and provide additional support, if necessary.
- Secure the machine against rolling away.

Only if these regulations are observed can safe working be ensured during care and maintenance work. Unsecured or non-supported machines can cause accidents.

No persons in the working area
Ensure that no persons – children in particular – are present in the slewing and working area of the machine. Persons could be caught by the machine within this area. This could result in fatal injury.

Do not clean bearing parts with high-pressure cleaners
Do not clean bearing parts with a high pressure cleaner. The high-pressure cleaner removes the grease film from the bare metal surfaces. Metal surfaces treated in this way can corrode. After each cleaning procedure, lubricate the bearing points and grease uncoated parts.

Clean the bearing parts with care
Exercise caution when cleaning with a high-pressure cleaner. Bearings, seals and pipe unions are not waterproof. In order to prevent damage to the machine, the bearings, seals and pipe unions must not be exposed to direct contact with the high pressure water jets.

Cleaning and care

General

The following work steps are described in this section:

- »Cleaning«
- »Care«

Cleaning

- Switch off the tractor PTO shaft drive.
- Use the hydraulic control device to lower the rotors into the work position.
- Leave the machine coupled to the tractor's lower links.
- Lock the hydraulic control device.

- Switch off the tractor engine, put the parking brake in the park position, remove the ignition key and secure the tractor against rolling away.
- Do not clean the bearings and piston rods of hydraulic cylinders using a high-pressure cleaner.
- After each use, clean the machine of any coarse dirt and crop residue.

After cleaning

- Lubricate all bearings after cleaning.
  → Observe the chapter »Maintenance« and the following pages.
- Replace missing warning signs and stickers.

Care

For a long service life, we recommend the following:

- Apply a protective layer of oil to all uncoated work tools. Only use approved, biodegradable oil, e.g. rapeseed oil.
- Repair any paint damage.

Setting down the machine in a secure position

When setting down and parking the machine, special safety precautions have to be observed:

Observe the safety information
Observe the safety information. Disregard for safety information can lead to serious or fatal injury. See chapter »Safety«, page 7.

Keep children away from the machine
Forbid children from playing on or around the machine. Select a parking area to which no unauthorised persons have direct access. Metal edges and machine work tools can cause serious injury.

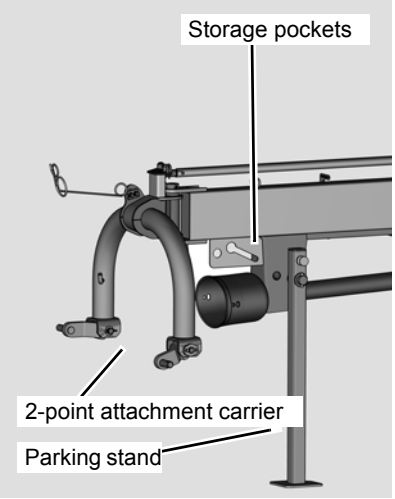
Make sure the machine is standing level
Before changing from the transport to the work position (and vice versa), make sure the machine is standing level. The machine could tip over, particularly on hillside locations. Damage to the machine and serious or fatal injury may be caused as a result.

General

The machine must be uncoupled in the reverse order to that in which it was coupled.

→ Chapter »Lifting the rotors into the transport position« page 58.
→ Chapter»Coupling the machine«, section »Coupling the lower link« page 38.

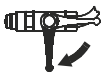
Uncoupling and securing the machine



To uncouple the machine from the tractor, proceed as follows:

- Switch off the tractor PTO shaft drive.
- Set the machine down on a firm, level surface and lower it to the work position.

- Switch off the tractor engine, put the parking brake in the park position, remove the ignition key and secure the tractor against rolling away.
- Secure the machine against rolling away.

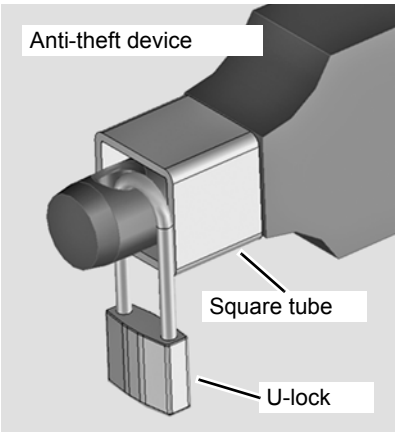


- Pull off the PTO shaft and place it on the holder provided.
- Close the ball valve and release the hydraulic couplings.
- Place hydraulic couplings in storage pockets.
- Secure all tine supports which have tips that point at right angles to the direction of travel and which are at a height of less than 2 metres (6.6 ft) with the tine covers.
- Disconnect the lighting plug and place it in the storage pocket.
- Lower the parking stand and secure with pins.
- Wind the electrical cables onto the hook.

- Switch on the tractor engine.
- Lower the lower link until the parking stand rests safely on the ground.
- Release the latch for the lower link of the tractor on the 2-point attachment carrier.
- Lower the lower link of the tractor and unhitch the machine.
- Drive the tractor forwards slightly.

- Switch off the tractor engine, put the parking brake in the park position, remove the ignition key and secure the tractor against rolling away.
- Secure the machine against unauthorised use.

Locking and securing



To secure the machine against unauthorised use, an anti-theft device corresponding to the type of coupling is included in the scope of delivery.

- Place the square tube on the pin of the lower link and secure with the u-lock.

After the end of the season

After the end of the season and if the machine is to be stored for a relatively long period of time, perform the following work:

- Clean the machine thoroughly.
- Check all the screw joints and tighten the screws.
  → Observe the correct torque specifications in chapter »Screw and bolt tightening torques« on page 84.
- Repair or replace any damaged components.
- Repair any paint damage.
- Lubricate the machine in accordance with the lubrication schedule.
- Check the tyre pressures.
- Replace missing warning signs and stickers.

Safety

The following applies to all servicing work:

Observe the safety information
Observe the safety information. Disregard for safety information can lead to serious or fatal injury. See chapter »Safety«, page 7.

Requirements for maintenance work
Only perform the maintenance operations if you have the required expert knowledge and suitable tools. The absence of technical knowledge or suitable tools can cause accidents and injuries.

Protect the machine against unintended starting
The following conditions must be observed for carrying out repairs and maintenance work and rectifying malfunctions on the machine when it is coupled:

- Switch off the PTO shaft drive.
- Switch all operating controls to the neutral or park position.
- Put the tractor's parking brake into the park position.

- Switch off the tractor engine, put the parking brake in the park position, remove the ignition key and secure the tractor against rolling away.
- Ensure the machine is standing on firm, secure and level ground, and provide additional support, if necessary.
- Secure the machine against rolling away.

Serious accidents may be caused if the machine starts accidentally.

Use OEM replacement parts
Many components have special properties that are essential for the stability and correct operation of the machine. Only spare parts and accessories supplied by the manufacturer have been tested and approved. Other products may adversely affect the correct operation of the machine and safety. The use of non-OEM replacement parts renders the manufacturer's guarantee null and void and frees the manufacturer from all liability.

Secure moving parts
Moving parts must be secured with lifting gear against sliding, folding or swivelling. Otherwise, serious injury to persons or damage to the machine may be caused as a result.

Disconnect electrical connections before performing welding work
Disconnect all electrical connections from the tractor when carrying out welding on the hitched machine. Otherwise, electrical and hydraulic systems may be damaged as a result.

Protective measures when handling oils or lubricants

Additives in oils and lubricants may have adverse effects on health. As marking in accordance with the hazardous goods regulation is not necessary, please always ensure the following:

Avoid skin contact
Avoid skin contact with these materials. Protect your skin by means of protective skin cream or oil-resistant gloves. Contact can result in skin damage.

Do not use oils for cleaning
Do not use oils or lubricants to clean your hands. Swarf and abraded material in these materials can also result in injuries.

Change out of dirty clothing
Change out of clothing that is heavily soiled with oil as soon as possible. Oils can be hazardous to your health.

- Used oil must be collected and disposed of.
- If the skin is damaged by oil or lubricant, seek medical advice immediately.

General

This information relates to general servicing work. For all servicing work, the machine must be locked in the work position. If transport position is required for maintenance work, you will find appropriate information for the maintenance work.

- Lower the rotors into the work position.
- Secure the machine against rolling away by using chocks.

Direction information

Direction information (right, left, front, rear) is given in relation to the direction of travel. Rotary direction is defined as follows:

- Rotary direction right = clockwise.
- Rotary direction left = counterclockwise.
- Rotation about a vertical axis, viewed from top to bottom.
- Rotation about a horizontal axis, viewed at right angles to the direction of travel, from left to right.
- The rotation of screws and nuts, etc. is always viewed from the operating side.

Maintenance terms

Listed in this table are short explanations of the most important maintenance terms.

Task	Explanation
Greasing	Apply grease to the slide surfaces using a brush.
Lubrication	One or two presses of the grease gun, unless specified otherwise.
Oiling	Unless specified otherwise, use only plant-based oils, such as rapeseed oils. The use of used oil will endanger your health and is also strictly prohibited.
Replacement	Replace the appropriate part in accordance with the instruction in the Maintenance chapter.
Inspection	Check the tyre pressures, adjustment dimensions and seal tightness as required, and replace any worn parts or seals.
Observe the maintenance intervals.	The specifications relate to an average usage of the machine. If subjected to heavier duty (e.g. by contracting companies), select the maintenance intervals to be shorter. Also, for extreme working conditions (for example heavy dust creation), shorter maintenance intervals are possible.

Lubricant

Lubricant used on this machine must meet the following requirements:

Lubricant	Specifications
Gear oil	SAE 90 API-GL-4 or 5
e.g.: KUBOTA HEAVY DUTY 80W-90 GEAR OIL	
Grease	NLGI GC/LB
e.g.: KUBOTA Polyurea Grease	

Maintenance intervals

	After the first 5 hours of operation	Daily	After 20 hours of operation	After 30 hours of operation	After 250 hours of operation	Once per season	After heavy use	As required	In case of wear	Lubrication	Greasing	Inspection	Replacement	Cleaning	Page
General															
All screws	●					●		●							85
Visual inspection		●					●					●			
Bearings				●			●			●					87
Hose connections						●						●			
Air pressure		●						●				●			91
Lighting equipment								●				●		●	
Hydraulics															
Hydraulic hoses every 6 years								●					●		91
Hydraulic hoses		●					●	●				●	●		91
Hydraulic cylinders						●	●	●				●			87
Hydraulic couplings								●						●	91
PTO shafts															
Single joints		●	●			●	●			●					88
PTO shaft guard		●			●	●				●		●			88
Profile section tube		●	●			●					●				88
Gearbox															
Rotor gear								●				●			89
Angular gear box								●				●			89

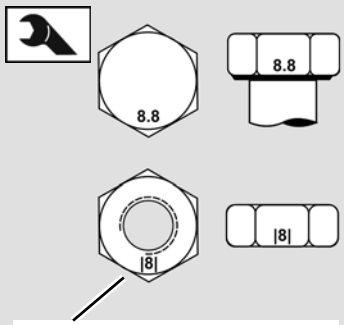
Screwed connections

Tightening screws

All bolts must be retightened:

- After the first 5 hours of operation.
- According to the frequency of use.
- At least once a season.

Screw and bolt tightening torques



Use the correct screw and bolt tightening torques
Securely tighten screws, nuts and bolts to the specified torques. The machine could be damaged and serious or fatal injuries could be caused.

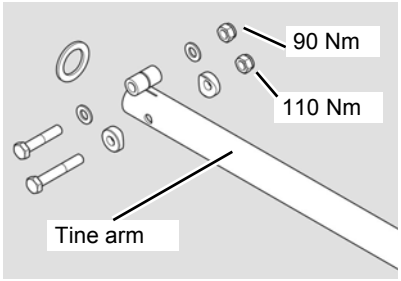
All bolt connections must be tightened in accordance with the table below, if no other torques are specified. On this machine, bolts with a minimum quality of "8.8" (can be seen on the bolt head) are used. The torque specifications refer to a dry coefficient of friction (0.12).

Bolt size	Bolt quality		
	8.8	10.9	12.9
M 6	9.9 Nm (7.3 ft.lbs)	14 Nm (10.3 ft.lbs)	17 Nm (12.5 ft.lbs)
M 8	24 Nm (17.7 ft.lbs)	34 Nm (25 ft.lbs)	41 Nm (30.3 ft.lbs)
M 10	48 Nm (35.4 ft.lbs)	68 Nm (50.2 ft.lbs)	81 Nm (59.8 ft.lbs)
M 12	85 Nm (62.7 ft.lbs)	120 Nm (88.6 ft.lbs)	145 Nm (107 ft.lbs)
M 14	135 Nm (99.6 ft.lbs)	190 Nm (140 ft.lbs)	230 Nm (166 ft.lbs)
M 16	210 Nm (155 ft.lbs)	290 Nm (214 ft.lbs)	350 Nm (258 ft.lbs)
M 20	410 Nm (302 ft.lbs)	580 Nm (428 ft.lbs)	690 Nm (509 ft.lbs)

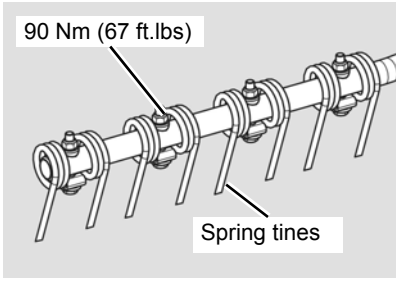
Tighten safety bolts and lock nuts to a 10% higher value.

Special tightening torques

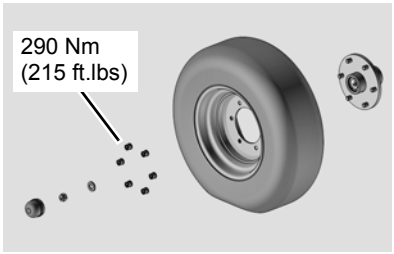
Observe the special tightening torques for the following screwed connections:



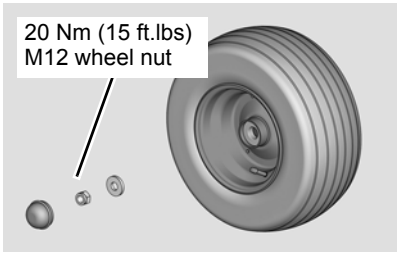
- Tine arm clamping bolt: 90 Nm (67 ft.lbs).
- Tine arm fixing bolt: 110 Nm (81 ft.lbs).



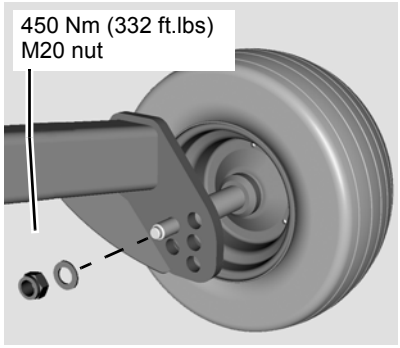
- Spring tines: 90 Nm (67 ft.lbs).



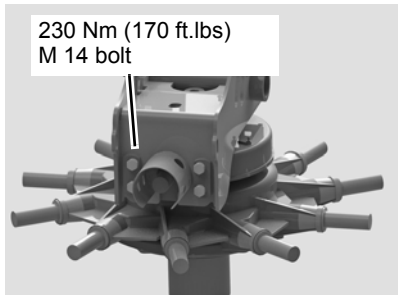
- Chassis wheel nuts: 290 Nm (215 ft.lbs).



- Wheel nuts on the rotor chassis: 20 Nm (15 ft.lbs).



- M20 nut, rotor chassis wheel stud: 450 Nm (332 ft.lbs).



- 230 Nm (170 ft.lbs) M 14 rotor gear bolt.

Lubrication points for grease lubrication

Before applying the grease gun

- clean grease fittings and
- grease gun attachment fitting.

Working with a grease gun

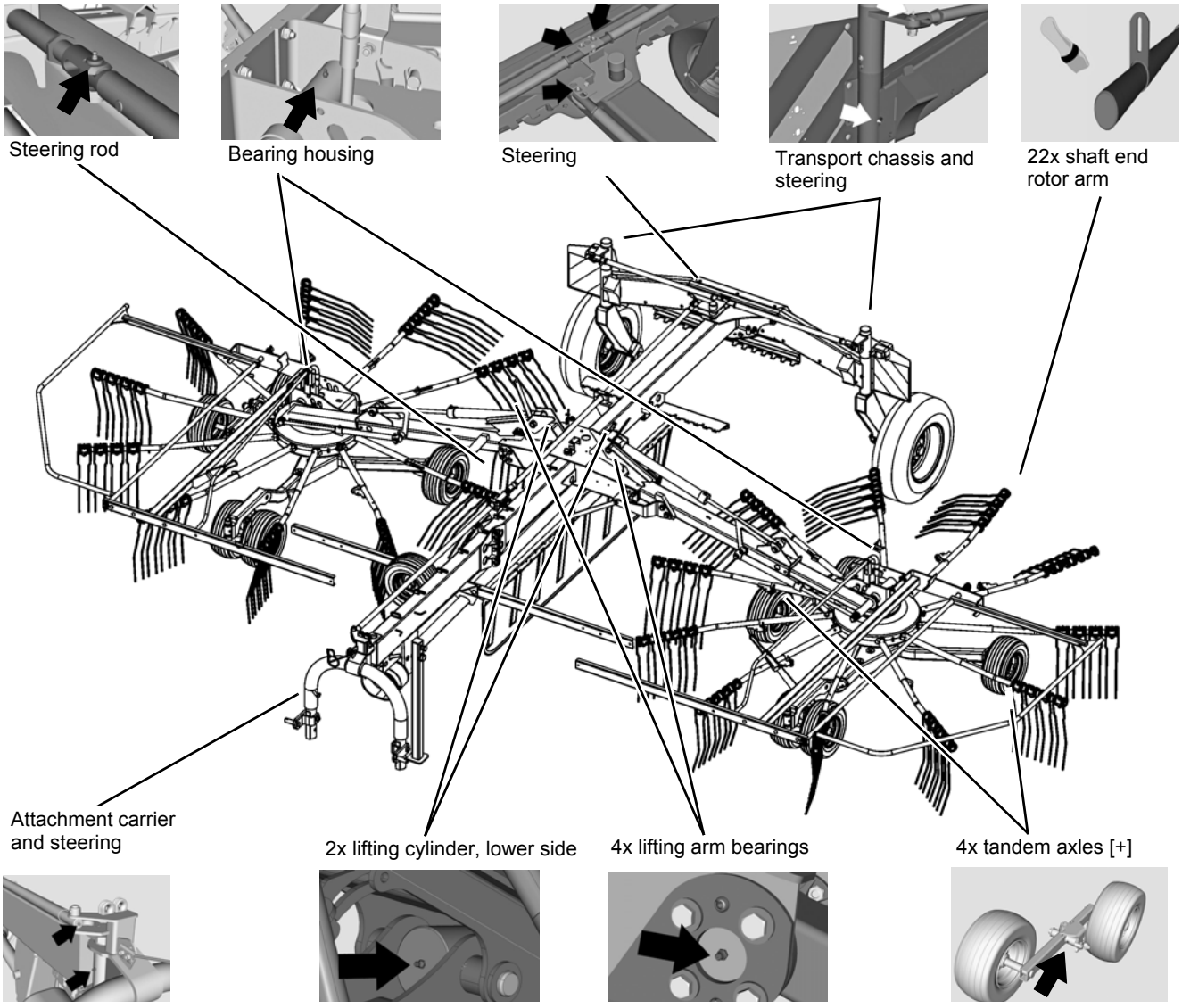
Lubrication points are marked with an information label.
Before applying the grease gun

- clean grease fittings and
- grease gun attachment fitting.

Lubricate the bearings with one or two presses of the grease gun. If you feel resistance at the second press, do not press a second time. Too much grease will force the bearings apart. Dust and dirt can penetrate into the bearings. This leads to premature wear.

Lubricate the places listed in the illustration as follows:

- After the first 5 hours of operation
- After 50 hours of operation.
- Before and after the season.
- Each time after cleaning with a high-pressure cleaner



Lubricating the PTO shafts

The PTO shaft manufacturer's own operator's manual is included with each PTO shaft. This includes detailed information on the relevant version of the PTO shaft.

Check the guard components
Check all guard components of the PTO shafts for wear or damage (visual inspection). Replace any defective guard components. An unguarded PTO shaft or damaged guard components can cause very serious injuries during operation.

Lubricate the single joints and their couplings as follows:

- After 50 hours of operation.
- Before and after the season.
- Each time after cleaning with a high-pressure cleaner.

Grease the profile section tubes:

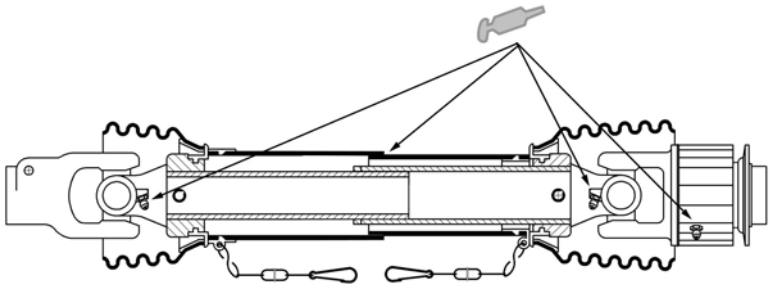
- After 50 hours of operation.
- Before and after the season.
- Each time after cleaning with a high-pressure cleaner.

Lubricate the guard as follows:

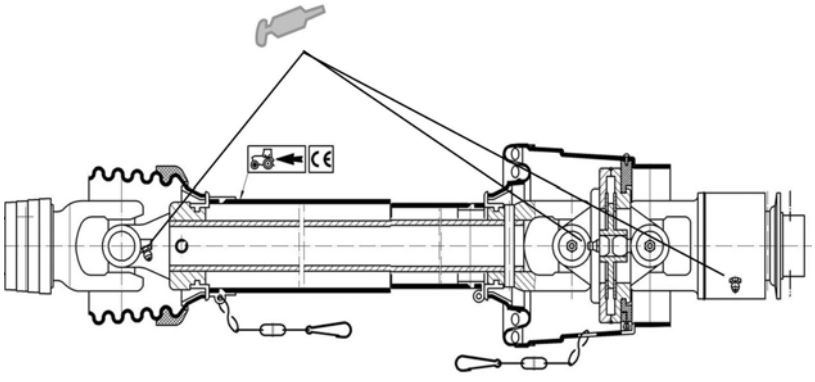
- after 250 hours of operation.
- Before and after the season.
- Each time after cleaning with a high-pressure cleaner.

PTO shaft for rotors (side shaft)

To lubricate the PTO shaft, remove it on the coupling side and slide the profile section tubes together.



PTO shaft for main drive



Filling quantities

Observe the correct fill quantities
Observe the correct lubricant fill quantities. Check them regularly. A lubricant level which is too low or too high may result in damage to the machine.

The main gear box and rotor gear require no maintenance.

Gearbox	Max. oil capacity [litres] SAE 90 API-GL-4
Angular gear box	1.0 (1.07 US qt)
Rotor gear, left	6.2 (5.46 US qt)
Rotor gear, right	6.2 (5.46 US qt)

- No oil change is required.
- The maintenance-free gear box is filled ex works with sufficient oil.

▸ Only check the oil level in the work position (machine positioned horizontally), if there is visible oil loss.

Tyres

Do not drive with worn or damaged tyres
Replace worn or damaged tyres immediately. There is a high risk of accident when driving on the road with such tyres.

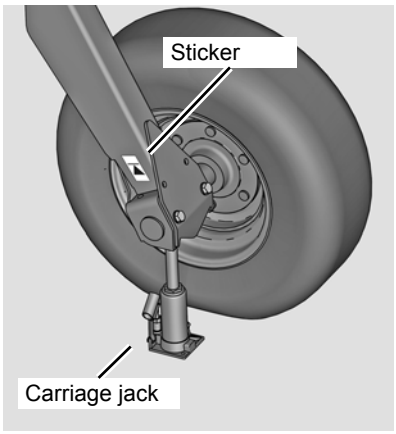
Tyre pressure

Check the tyre pressures on a regular basis:

- daily.
- Before any road transport.
- As required (for example before setting the tine height).
- Before and after the season.

	Tyre pressure [bar]
Rotor chassis	1.5 (22 psi)
Transport chassis	2.5 (36.5 psi)

Replacing tyres

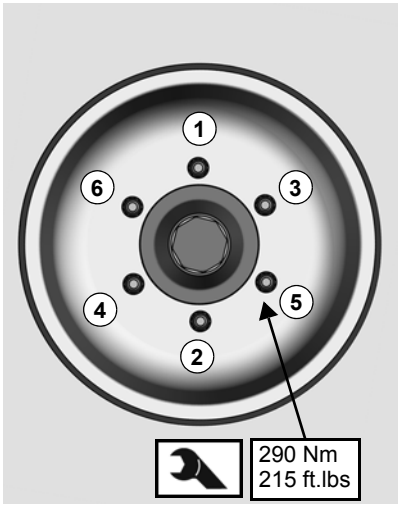


Using the carriage jack correctly
Jacking points for the carriage jack are identified with a sticker.

- Secure the machine against rolling away.
- Use a suitable carriage jack.

If these safety instructions are not observed, damage to the machine and accidents may be caused as a result.

- Secure the machine against rolling away and use a suitable carriage jack*.
- Lift the machine at the labelled jacking points.
- Replace the wheel.
- Tighten the wheel nuts to the correct torque (290 Nm, 215 ft.lbs), diagonally across from each other. See adjacent illustration.



- After each wheel replacement, retighten the wheel nuts and wheel screws after the first 10 hours of operation. Afterwards, check that they are attached firmly every 50 operating hours.

* The carriage jack is not included in the scope of delivery.

Hydraulics

Hydraulic system at zero pressure
Work must only be performed on the hydraulic system if the tractor and machine hydraulic system is at zero pressure. A pressurised hydraulic system can trigger unpredictable movements of the machine and can cause serious machine damage and personal injury. Serious or fatal injury may be caused as a result.

Exercise caution when welding
Do not perform any welding work in the vicinity of the hydraulic hoses. Hydraulic oil can catch fire very easily.

Clean hydraulic system
Close or disconnect the quick couplings with great care. Remove any dirt or air which has entered the hydraulic system. The hydraulic system may otherwise be seriously damaged. Material damage or personal injury may be caused as a result.

Collect escaping oil
Escaping oil must be collected and disposed of in accordance with national regulations. Otherwise, damage may be caused to the environment.

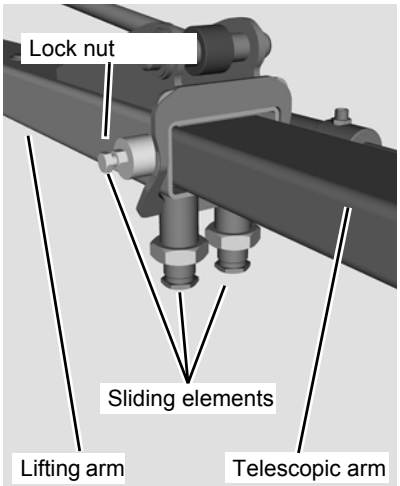
Hydraulic hoses

Replace hydraulic hoses every six years or sooner
Hydraulic hoses age without showing externally visible signs. Replace hydraulic hoses every six years or sooner. Use hydraulic hoses only with the same technical specifications. The required information is printed on the hydraulic hose. Defective or incorrect hydraulic lines can cause serious or fatal injuries.

Hydraulic hoses age without showing externally visible signs. We therefore recommend replacing the hydraulic hoses every six years.

- Lower the rotors into the work position.
- Depressurise the system.
- Switch off the tractor engine, put the parking brake in the park position, remove the ignition key and secure the tractor against rolling away.
- Disconnect the hydraulic hoses.
- Replace hydraulic hoses.

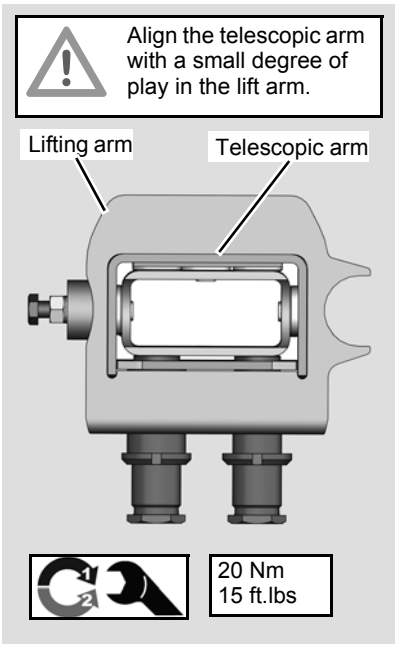
Checking sliding elements



The sliding elements on the two lifting arms ensure smooth and even running of the telescopic arms. The sliding elements must be checked on a regular basis, and readjusted and the sliding surfaces lubricated if necessary.

- Check that the telescopic arms retract and extend correctly in the headland position. Readjust the sliding elements in the case of:
  - Uneven or jerky movements of the lift arms in the headland position.
  - Inclined position of the telescopic arm in the lift arm.
  - Large vibrations of the rotor in the headland position.

Adjusting the sliding elements



- Lower the rotors into the work position.
- Undo the lock nut.
- Adjust the sliding element by means of bolts so that the telescopic arm moves in and out evenly and freely in the headland position.
- Tighten the lock nut.
- Using a brush, apply grease to the sliding surfaces of the telescopic arms.

When readjusting the sliding elements, make sure that you first tighten the bolts until they lock (max. 20 Nm/15 ft.lbs), then slacken them slightly (approx. 1/2 turn).

- If the sliding elements are fastened too tightly, the telescopic arms will not travel smoothly.
- If the sliding elements are not fastened sufficiently, the rotor will vibrate.

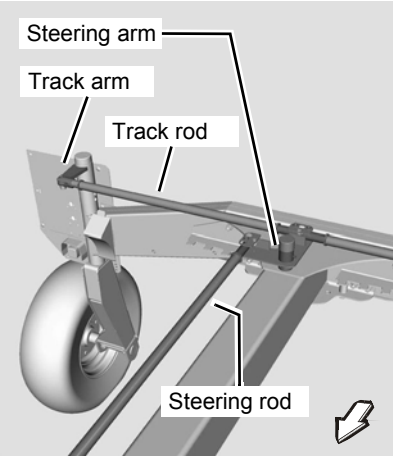
In both cases, this may result in damage to the machine.

Steering

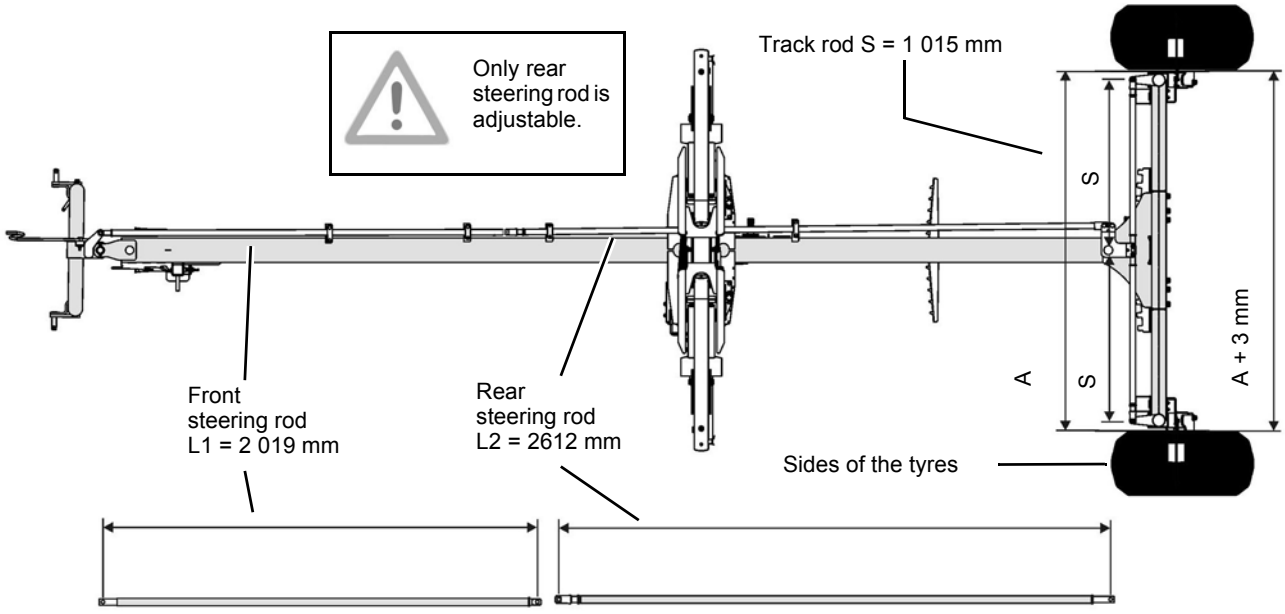
Never carry out work on the steering
Contact your dealer if specifications differ. Never carry out any work on the steering or tracking yourself. This can result in traffic accidents and accidents causing serious or fatal injuries.

Checking the track

If the machine rolls at an offset angle to the tractor when driving a straight line, the directional stability is set incorrectly. Proceed as follows:



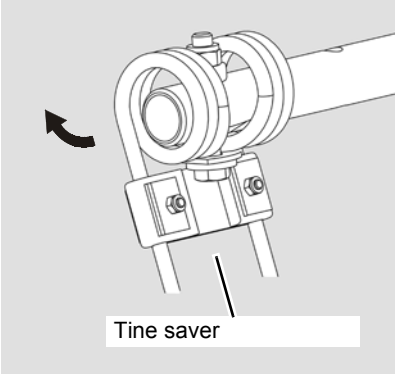
- Switch off the tractor engine, put the parking brake in the park position, remove the ignition key and secure the tractor against rolling away.
- Control length
  - of the front steering rod: L1 = approx. 2019 mm (79.58 in).
  - of the rear steering rod: L2 = approx. 2612 mm (102.83 in).
  - of the track rods: S = 1015 mm (39.96 in).
- Check track A at the front and rear sides of the tyres.
  - Front: A
  - Rear: A + 3 mm (0.12 in).



Accessories

Optional additional equipment does not form part of the standard scope of delivery, and, in this manual, is indicated by a plus symbol [+]. Additional equipment is available to order from your dealer.

Tine saver

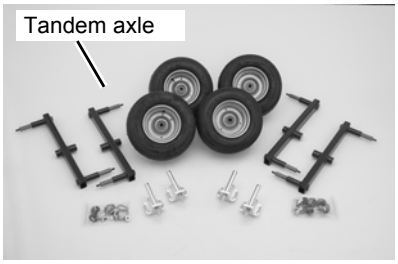


For a good swath deposit, both tine legs must run parallel to one another. This must also be ensured after fitting the tine saver.

Proceed as follows:

- Fit one tine saver on each tine.
- Check the direction of rotation of the rotor. The nuts must be attached against the rotor direction.
- Check the tine position. The tine legs must be parallel.
- If necessary, loosen the screwed connection until both tine legs run parallel.

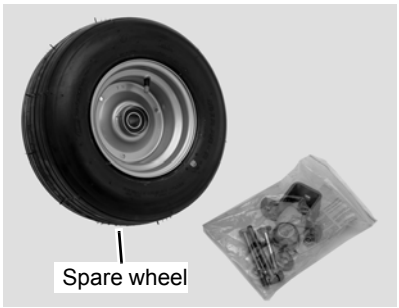
Tandem axles



The optional tandem axles make for better contours. Note: the wide track is in front.

- The tandem axles replace the rear running wheels of the rotor chassis.
- Separate assembly instructions are supplied.

Spare wheel



The optional spare wheel is fitted to the guard bar of the machine.

- The spare wheel is fitted to the machine's guard bar.
- Separate assembly instructions are supplied.

Electro-hydraulic control system

The optional electro-hydraulic control system enables the hydraulic single lift function.

Fault

Faults can often be eliminated quickly and easily. Before contacting Customer Service, refer to the table to check whether you can remedy the fault yourself.

What to do in the event of a fault
In case of a fault, proceed as follows:

- Immediately stop operation.
- Switch off the tractor PTO shaft drive.
- Switch off the tractor and secure it.

The fault must be repaired before work can be resumed. Otherwise, damage to the machine and serious or fatal injury may be caused as a result.

Problem	Cause	Solution
Rotor is leaving crop in situ on one side and is digging too deeply into the ground on the other side.	Incorrect adjustment of rotor pitch.	→ Chapter »Preparing for use«, section »Rotor pitch«, page 48.
Rotor is leaving crop behind across the entire width.	Working depth set too high.	→ Chapter »Preparing for use«, section »Rotor pitch«, page 48.
Crop is heavily contaminated.	Rotor tines set too low.	→ Chapter »Preparing for use«, section »Rotor pitch«, page 48.
		→ Chapter »Coupling the machine«, section »Coupling the lower link«, page 38.
Machine not operating cleanly at high speed	Rotor tines set too high. Uneven terrain.	→ Chapter »Preparing for use«, section »Rotor pitch«, page 48.
	Speed too high to process crop mass	Reduce speed.
Rotor dragging crop along – Unclean swath form	Crop mass too large.	Reduce speed.
	Rotary speed too high.	Reduce speed.
PTO shaft coupling responding frequently	Crop mass too large or uneven.	Reduce speed.
	Rotor tines set too low.	→ Chapter »Preparing for use«, section »Rotor pitch«, page 48.
Noise production during work	Loose screwed connections or worn-out tine supports. Tine support bent	Check tine supports and screwed connections on tines.
Machine rolls offset behind the tractor when driving in a straight line.	Steering/tracking incorrectly adjusted or worn out.	Contact dealer.
Rotor not working cleanly.	Poor adaptation to the contours of the land due to severe rotor load relief	Please consult your dealer. You will find assistance under »Circuit diagrams«, page 98.

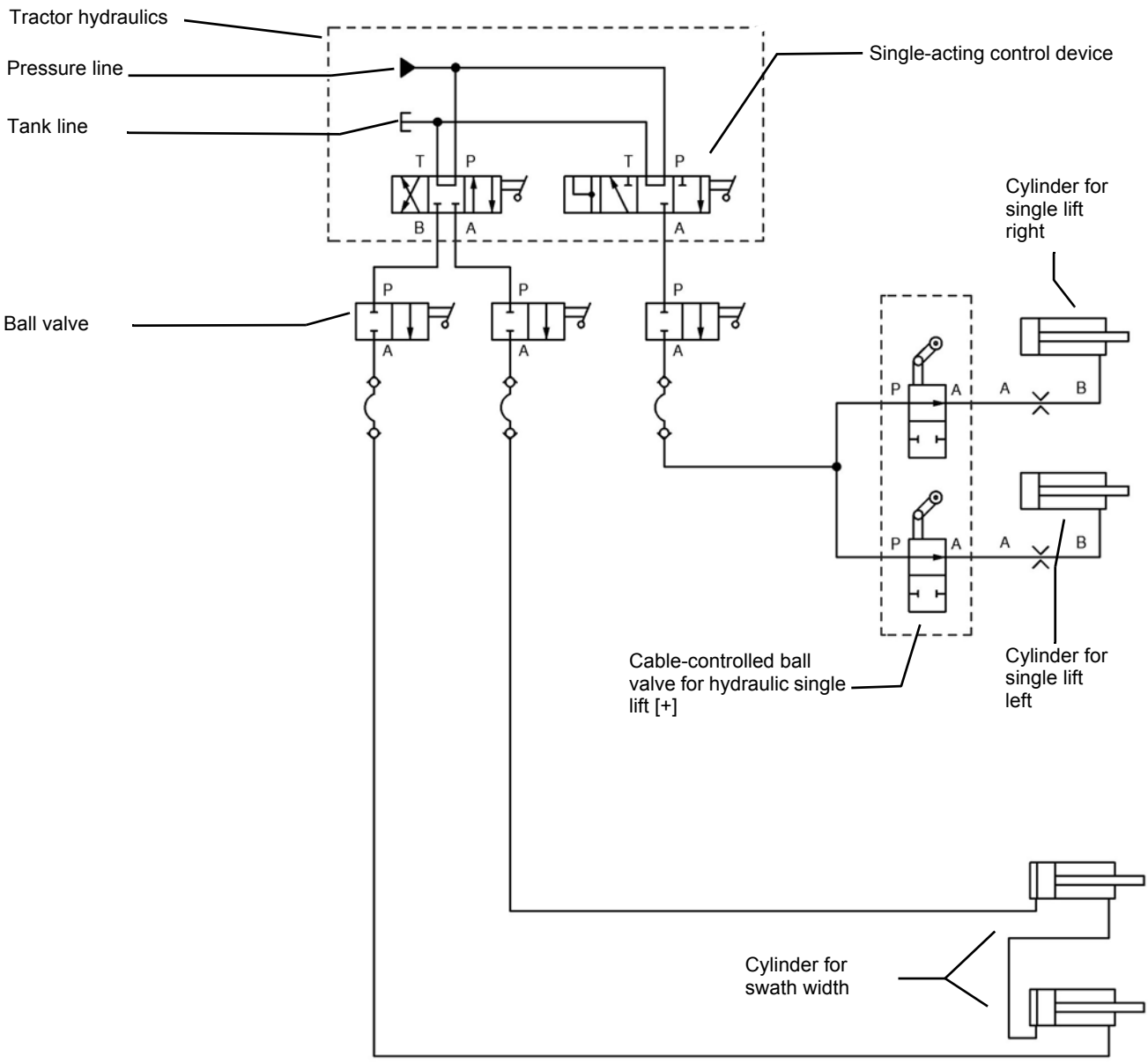
Electronic system faults

Problem	Cause	Solution
Pilotbox is not functioning.	The control device has no power.	▸ Switch the pilotbox on. ▸ Check the power supply for the system. ▸ Check the fuses.
	Internal pilotbox problem.	Please consult your dealer.

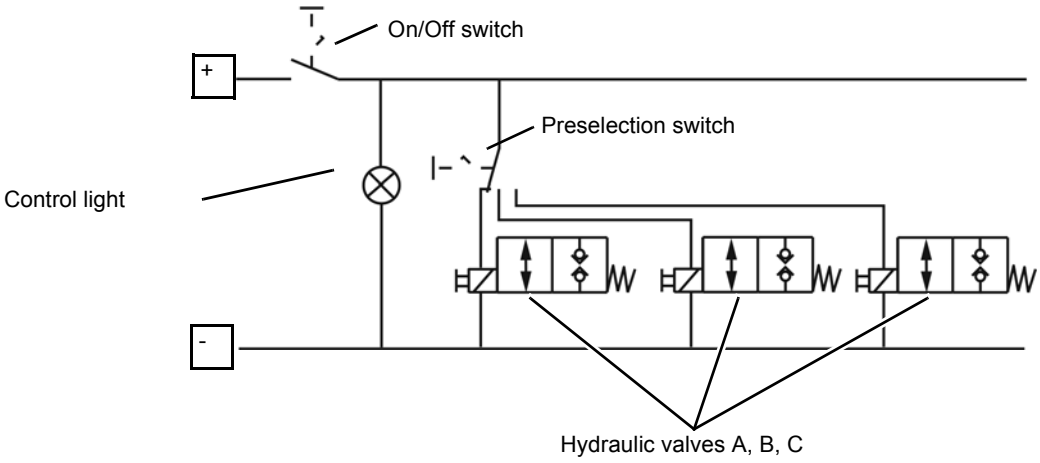
Hydraulic system faults

Problem	Cause	Solution
No functions are carried out via the hydraulic control device using the control box.	Defective solenoid valve	▸ If required, carry out the emergency function. ▸ Check the solenoid valve. ▸ Replace the defective solenoid valve.

Hydraulic circuit diagram

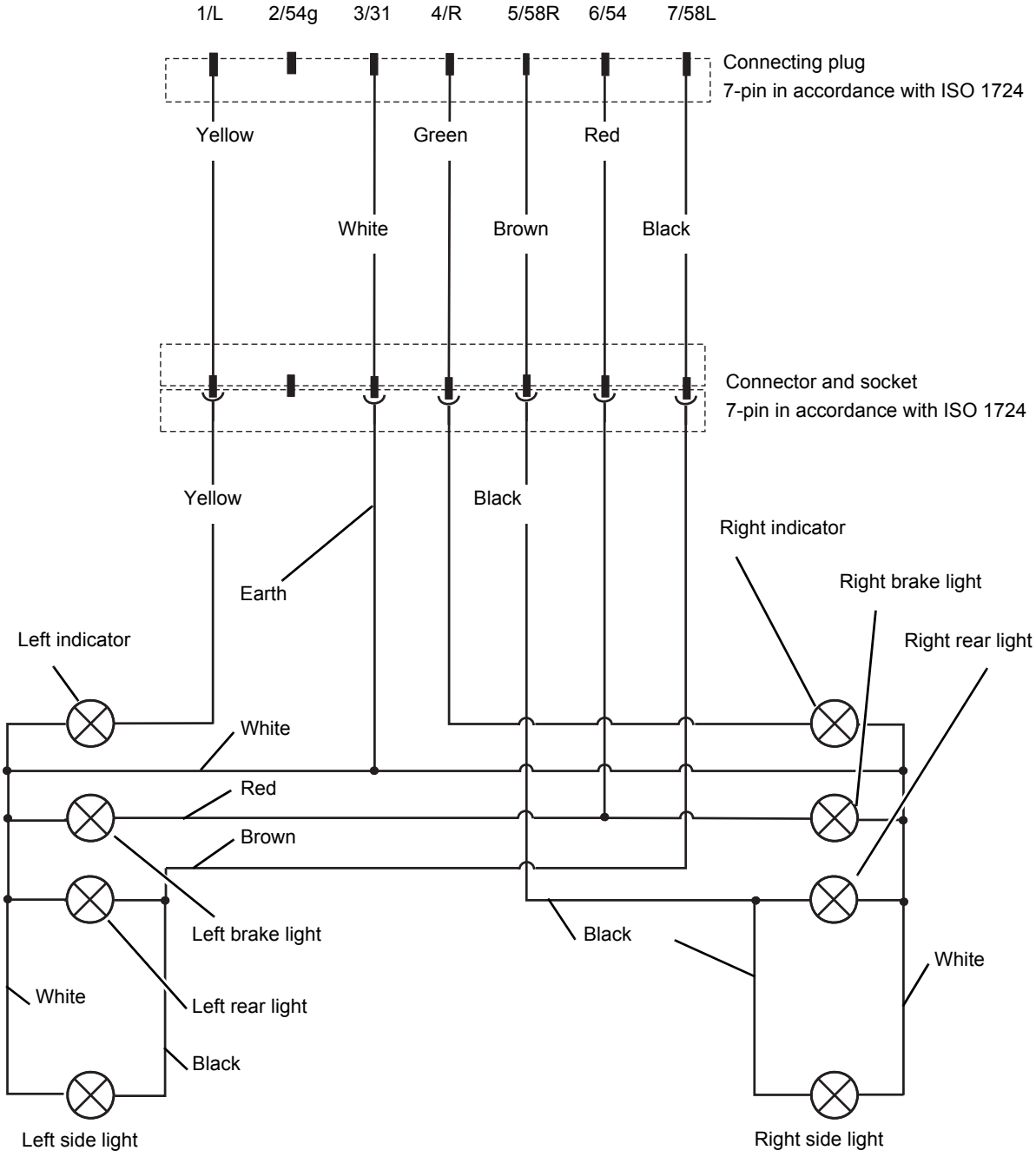


Pilotbox circuit diagram



Pilotbox	Solenoid valve connection	Function
A	Y1	Raise and lower the left-hand lift arm.
B	Y2	No function.
C	Y3	Raise and lower the right-hand lift arm.

Lighting circuit diagram



Disposal

During decommissioning, the individual parts must be disposed of properly and in an environmentally friendly manner. Please observe the waste disposal guidelines that are currently in force.

Plastic parts
Plastic parts can be disposed of in normal household waste (residual waste), depending on the laws specific to your country.

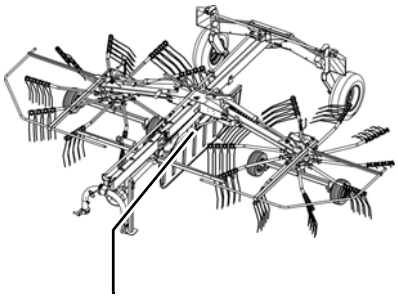
Metal parts
All metal parts can be sent for recycling.

Oil
In terms of waste legislation, environmentally-compatible hydraulic oils must be stored, collected and disposed of separately in accordance with regulations.

Rubber
Rubber parts, such as hoses or tyres, must be brought to a rubber recycling centre.

EC Conformity Declaration

Conforms to EC Directive 2006/42/EC



Type plate and CE marking

We

Kverneland Group Kerteminde AS
Taarupstrandvej 25
DK-5300 Kerteminde
Denmark

declare with sole responsibility that the product

Andex 764 **9476 C** **RA2076** **and its accessories**
Model: RAC 6958
Valid from machine number: **UKGRACB6CH2S04501**

to which this declaration relates, comply with the relevant basic health and safety requirements of EC Directive 2006/42/EC.

To demonstrate our compliance with the health and safety requirements quoted in the EC Directive, we make reference to the following standards:

- EN ISO 4254-1:2013
- EN ISO 4254-10:2009 + AC:2010

Kverneland Group Kerteminde AS
Kerteminde, 13.11.2017

Uwe Kellermeier

CEO
and authorised representative*

* person who is responsible for compiling the technical documentation and resides in the European Community. See address above.

W